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The Relationship between Professional Development and Teacher Change in the Implementation of Instructional Strategies that Support Elementary Students' Science Textbook Reading

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by

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This study examined the relationship between a series of professional development workshops and change in three rural elementary teachers' science textbook reading instructional strategies. The analysis of the qualitative data indicates the degree of teacher change was related to several inner-related factors: (a) teaching experience, (b) teacher perceptions of self, (c) mode of content delivery, and (d) teacher beliefs. Two teachers with the greatest longevity of teaching experience had previously established instructional strategies and modes of content delivery which did not emphasize student textbook reading skills. Their modes of content delivery were related to their self-perceptions as "science teachers" who provided learning experiences for their students outside of reading the science textbook. The main mode of content delivery for the teacher with the least amount of experience was her students' reading and comprehending the textbook. This teacher demonstrated the most change in science textbook reading strategy implementation by utilizing a package of informational text reading strategies and gradually releasing the control of strategy application to her students.

Dedication

This academic work is dedicated to my husband Bill and our children, Monica and Randall. As they traveled this challenging journey with me, they supported me with love and patience. They showed me faith when mine waivered and gave me confidence to continue moving toward my goals when life events presented numerous obstacles. I have learned from them that one can achieve their dreams in any stage of life, and with patience, dedication and a passion for knowledge, it is never, never too late to learn.

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Table of Contents

Chapter One

Introduction

Informational Text Reading Skills

Life-long skill. Reading and comprehending informational text is a skill valued in multiple settings in school, community and work (Duke, 2000). Adults encounter a vast array of informational text in periodicals, instruction manuals and within information provided by modern technology, all of which convey information about the natural or social world (Duke, 2004). Adults who possess informational reading skills and strategies are able to participate in a society that is technically advanced and saturated with informative text (Gambrell, 2005). Most learning in school, whether as an adult or a student, depends on the ability to read and understand informational text (Armbruster; Anderson & Ostertag, 1987).

School setting. In the school setting, students typically encounter informational text in the third grade when the science and social studies textbooks are introduced into the curriculum; the primary purpose of reading these texts is to learn and recall facts (Bakken & Whedon, 2002). The textbook often is the core curriculum, and academic success in social studies and science are directly related to the children's ability to read and comprehend informational texts (Harniss, Dickson, Kinder, & Hollenbeck, 2001) including textbooks. Typically, acquisition of skills and strategies for reading comprehension occur in a formal educational setting. However, reading test scores and research results indicate a large number of students are unable to read and write informational text significantly well. This situation is disproportionately true for students from traditionally disadvantaged social groups (Duke, 2000).

Federal mandates. Students' difficulty in reading informational text has influenced educational institutions in the United States, the United Kingdom and Australia to turn the spotlight on expository text reading comprehension (Duke, 2000; Unsworth, 1997). In the United States, federal mandates for teacher accountability and increased student performance on high-stakes standardized tests have challenged policy makers, education researchers, and educators to examine students' reading skills in all genres and to provide programs for students reading below grade level. For example, the federal program, *Striving Readers*, (United States Department of Education, 2002), the principal goal is to improve the reading skills of middle- and high-school students who are reading below grade level. This program is earmarked for struggling readers in Title I eligible schools that are at risk of not meeting the yearly progress requirements under the No Child Left Behind Act (NCLB).To improve implementation of NCLB, Secretary of Education, Margaret Spellings has initiated new requirements for consistently low performing schools. Low-performing schools that have shown significant improvement in individual students' achievement can apply to the federal government for consideration of this growth in the state's accountability to the federal government (Hoff & McNeil, 2008).

Exposure to informational text in school. Research results indicate that students, beginning in the primary grades, are minimally exposed to informational text and comprehension strategy instruction for this genre in spite of the high demands of textbook-based curriculum in content-area reading in grades three through twelve and increased expectations of student performance on standardized reading tests (Duke, 2000). For example, Kamil (1994) found that approximately 80% of the teachers used predominantly narrative materials because they felt that expository materials would be too hard for students. Duke (2000), in her seminal study, found a troubling scarcity of information text in first grade classrooms. She observed that students received an average of 3.6 minutes per day of instruction with informational text.

Motivation to read. Other arguments for increasing attention to informational texts in the early grades have gone beyond preparing children for later schooling. Duke, Bennett-Armistead, and Roberts (2003) have pointed out that informational texts can play an important role in motivating children to read. Informational texts can capitalize on children's natural interests and curiosities, provide opportunities for children to apply and further develop areas of expertise and provide valuable links to children's home literacy experiences (Duke, 2000)). Availability of informational texts and instructional strategies to read and comprehend this genre are essential components of early literacy programs in elementary schools. Children will be better prepared to read and comprehend information texts when they encounter them in the content areas of education. The necessity of reading and comprehending informational text does not stop with formal schooling; adults, need skills and strategies to read informational text to meet the demands of a literate society (Duke, 2000).

Change in pedagogical practices. Change in teacher pedagogical practices that incorporate skills and strategies that facilitate informational text comprehension is a plausible solution to this problem as well as preventive measure to reduce the need for federally mandated programs. Teacher-change in instructional choices can be facilitated through the implementation of professional workshops that provide training in effective and efficient informational text instructional skills and strategies.

Professional Development Workshops

Definition of Professional Development. School reform has been impacted by the demands of NCLB. These demands include accountability for educators at all levels. Accountability for school reform is especially true for leaders in professional development who have to meet the requirement for “scientific”, researched-based programs with a strong emphasis on student improvement (Guskey, 2003a). The recent trends in educational professional development encompass structured activities or courses in the workplace to enhance professional skills of educators, keep the educators up-to-date or to support change in the organization (Dall’Alba & Sandberg, 2006). Guskey (1986) and Hashweh (2004) describe professional development as a systematic attempt to bring about change. Guskey (1986) and Griffin and Barnes (1986) specifically describe the change components: (a) change in the classroom practices of teachers, (b) change in teacher’s beliefs and attitudes, and (c) change in the learning outcomes of students. When developing his model, Guskey (1986) questioned the order of these components.

Guskey’s model. In the past, professional development workshops have been based on the assumption that teachers need to change their educational narrative (beliefs and attitudes) first, before they can change instructional practices (Guskey, 1986). Guskey’s model reverses this order. In his view, real changes in teacher narrative must be preceded by changes in student outcomes. His model for teacher-change is based on the idea that change is a learning process for teachers that is developmental and primarily experientially-based. When teachers implement new instructional strategies over time that gradually lead to an increase in student achievement, their attitudes and beliefs about the new strategies will change. "The crucial point is that it is not the professional development *per se*, but the experience of successful implementation that changes teachers' attitudes and beliefs. They believe it [the new strategy] works because they have seen it work and that experience shapes their attitudes and beliefs" (Guskey, 1986 p. 383). Guskey (1986) states that the success of professional development hinges on two crucial factors: (a) teachers' motivation to engage in staff development, and (b) the process of teacher-change through implementation success as evidenced by student achievement. In relation to literacy, Walpole (2004) states the expertise of teachers directly relates to an increase in student achievement in reading and other content areas. When teachers implement instructional strategies that facilitate students' comprehension of informational text, students are better prepared to succeed academically when informational text becomes core to the curriculum at the end of the primary grades. Knowledge of informational text reading skills and strategies facilitates increased performance on high-stakes standardized reading tests (National Assessment of Educational Progress (NAEP), 2007). Therefore, changes in instructional practices that affect literacy learning outcomes are high-stake decisions.

Successful staff development. For changes in instructional practices to evolve, staff development needs to be well-organized, carefully structured, and purposefully directed on meaningful inquiry that directly connects to school goals (Guskey & Peterson, 1996; Lefever-Davis, Wilson, & Moore, 2003). Staff development is successful for teachers when they volunteer as opposed to being required to participate. When teachers are self-directed this leads to immersion and reflection; they have a personal investment. Teachers need to be provided with repeated opportunities to implement new instructional practices and time to continually collaborate and discuss newly learned ideas with other teachers (Hashweh, 2004). Knowledge and skills presented in the workshops are integrated even more effectively when teachers are provided with supporting research literature to read, classroom modeling and are given feedback after being observed implementing the new strategies in the classroom (Richardson, 1990).

Instructional Strategies

Purpose for strategy instruction. The ultimate goal of classroom reading instruction is to promote self-regulated readers who possess the skills (automatically applied actions) and strategies (consciously applied actions) to comprehend what they read and to develop metacognition to know when and how to apply the strategies (Paris, Wasik, & Turner, 1996; Afflerbach, Pearson & Paris, 2008). In Pressley, El-Dinary, & Gaskin's (1992) model of transactional strategies instruction, the process of developing self-regulated readers begins with the teacher introducing the strategy, modeling the strategy and scaffolding instruction as students gradually assume responsibility of strategy selection and application. The process of developing self-regulated readers aligns with Pearson and Gallagher's (1983) gradual release of control model that includes teacher-modeling, student practice, guided practice with scaffolded instruction and gradual release of control of the responsibility of strategy selection and application. The process begins with the teacher knowing the strategy, teaching the strategy, and modeling the strategy. To meet the needs of children learning strategies to read and comprehend their science textbook, change in informational text instruction needs to come first; this process begins with teacher instruction.

Goals of This Study

The primary aim of this study was to explore, through a multidimensional approach, teacher-change in instructional practices that facilitated student comprehension of their science textbook. The research literature includes numerous studies that explore the effectiveness of specific expository text comprehension strategies but few, if any, explore the effectiveness of such strategies through the perspective of teacher-change.

A secondary goal of this study was to explore the teachers' perceived change in student achievement and the influence of this perception on the teachers' attitudes and beliefs towards the new instructional practices. Guskey's model (1986) for professional development emphasizes that change in teachers' beliefs and attitudes towards the implementation of new instructional practices occur when those changes gradually lead to an increase of student achievement.

Definition of Terms

For the purpose of this study the following terms and their definitions are provided.

Term	Definition
Informational text/ Expository text	These two terms can be used interchangeably to mean literature written to inform. This type of literature contains information on specific topics such as a book that gives factual information about dinosaurs.
Skill	Information processing techniques that are automatic (Paris, Wasik, & Turner, 1996 p.611)
Strategy	Actions selected deliberately to achieve particular goals (Paris, Wasik & Turner, 1996 p. 611).
Rhetorical structure/ text structure	The organization of text that varies between narrative and informational text. Informational text is often organized as main idea/detail, cause/effect, problem/solution, time order, enumeration, and compare/contrast.
Content-area textbooks	Written discourse intended to provide a reader with information; is typically found in textbooks such as social studies, science or health.
Graphic organizer	A visual aid that defines hierarchical relationships among and across concepts in a texts' passage; a visual aid that displays the meanings of key vocabulary terms and non-technical vocabulary terms within the context of appropriate passages.
Professional/staff development	A purposefully-generated, systematic attempt to bring about change in teachers' classroom practices, change in their beliefs and attitudes towards instructional practices, and change in the learning outcomes of their students. Professional development takes place outside the classroom setting either before or after school or during specific time allocated during the school day when the teachers are released of their classroom duties.
Microstructure	The relationships that bind together individual sentences into a coherent structure.
Macrostructure	A text's pattern of organization that binds together its complex system of paragraphs.

Chapter Two

A Review of the Research Literature

Introduction

The following review of literature is threefold, focusing on studies that: (a) describe the need for instructional strategies that facilitate informational text comprehension in a formal educational setting, (b) explore research-based instructional strategies that facilitate student informational text comprehension, and (c) examine the historic development of professional workshops by examining past theoretical approaches that influenced trends in professional development and how these trends and approaches have evolved over time.

Expository Text Comprehension

Typically, by the time students reach third grade, they encounter informational books as part of the curriculum (Harniss, Dickson, Kinder, & Hollenbeck, 2001). Frequently the social studies and science textbooks serve as the foundation for the curriculum in these content areas. For students to succeed academically, they require the skills and strategies to read and comprehend texts that differ in structure from narrative text (Duke, 2004; Harniss, Dickson, Kinder, & Hollenbeck, 2001), a structure that is familiar to most children when they enter school. Research literature indicates that, because children are not prepared with skills and strategies to read informational text, their reading performance begins to decline by the time they reach fourth grade -- a phenomenon that Chall, Jacobs, and Baldwin, (1990) labeled, “the fourth grade slump.” As reading comprehension declines, motivation to read decreases (McKenna, Kear, &

Ellsworth, 1995). By 6th grade, 75% of the students' academic reading demands are with informational text (Moss & Newton, 2002), and this trend continues to middle and secondary school. Reading and comprehending informational text becomes progressively more problematic as students advance through the grades. By the time U.S. students reach the tenth grade, only a third are reading proficiently and nearly half of the 17-year-olds are unable to read at the ninth grade level, (Moss & Newton, 2002).

National test scores. According to the 2007 National Report Card, 67% of the fourth graders tested at the basic or below basic reading level and 74% of the eighth graders tested at or below the basic reading level. Basic level is "partial mastery of prerequisite knowledge and skills that are fundamental for proficient work" (NAEP, 2007).Even though, reading scores in both grades have shown an upward trend, a significant percent of both fourth and eighth grade students are reading below the proficient level defined as "Students reaching this level have demonstrated competency over challenging subject matter…" (Retrieved March 9, 2008 from http://nationsreportcard.gov/). Knowledge of skills and strategies that facilitate informational text reading are essential for successful performance on the National Assessment of Educational Progress (NAEP) reading test. Forty-five percent of the fourth grade reading questions and forty percent of the eighth grade reading questions were classified as "reading for information" or reading informational text (Retrieved March 9, 2008 from http://nationsreportcard.gov/).

Absence of informational text instruction. Some underpinning problems are students beginning in third grade and higher have encountered little or no prior instruction in recognizing rhetorical structure and are unlikely to have been taught strategies to read and comprehend their content-area texts (Duke, 2000). There are two plausible causes for the absence of instruction in reading expository text. First, teachers' beliefs are central to the concept that narrative is "primary" (Pappas, 1993). Children's beginning experiences with text, either being read to or exploring books independently, often focus on narrative text; their understanding of narrative text structure begins with oral story telling in their families and is reinforced through exposure to narrative text at school. Narratives tell stories about human events and actions which supports young children's understanding of the rhetorical structure of narrative text. When teachers read to young children, most often it is a narrative story. Vukelich, Evans, and Albertson (2000) state that 9 out of 10 books teachers read to children are narrative. Teachers utilize young children's prior knowledge of narrative text structure by teaching children reading skills and strategies with narrative texts, but there is no guarantee that children will transfer learned strategies to reading informational text. It is assumed that most young children have little or no experience with informational text which leads teachers to believe that without prior knowledge of the text structure in informational text, expository reading and writing is beyond the capability of young children (Casbergue & Plauché, 2003). Kamil (1994) found that approximately 80% of the teachers used predominantly narrative materials because they felt that expository materials would be too hard for the students. The assumption that stories are easier to comprehend because of their predictable structure is so deeply ingrained that almost all of the available programs for beginning reading instruction are based on narrative text (Kamil & Lane, 1997).

Teachers have the mistaken conception that children must learn to read before they read to learn (Casbergue & Plauché, 2003).

A second plausible cause for the absence of instruction in reading expository text is lack of availability of informational text in the primary classrooms (Duke, 2000). In her seminal study of 20 first-grade classrooms, Duke (2000) found the scarcity of informational text in the classroom libraries, wall displays and activities. She concluded from the data collected during classroom observations that students received an average of 3.6 minutes per day of instruction with informational text; the low socioeconomic students were more disadvantaged for this kind of instruction. Adding to the lack of availability of informational text in classrooms, the basal readers utilized for reading instruction in all grades are deficit in the amount of informational text they contain. Flood and Lapp (1986) found that 16% of the selections in basal readers were informational text. Baumann, Hoffman, Duffy-Hester, and Ro (2000) found a scarcity of informational text in basal readers in 85% of the classrooms they studied, kindergarten through grade 5. Giving support to this finding, Moss and Newton (2002) examined the quantity of informational literature found in six basal readers at grades two, four and six and found the mean percentage of selections devoted to informational literature ranged from 16% to 20% across grade levels. Duke, Bennett-Armistead, and Roberts (2003) confirm this notion stating that there is a scarcity of informational text in basal series in primary grades and, surprisingly, even less in upper elementary grades. Research literature indicates a pronounced scarcity of informational text in classrooms and in the basal readers utilized to teach reading skills to children.

Research Results for Informational Text Instruction

Teacher beliefs coupled with the scarcity of informational text in classrooms and basal readers are plausible explanations for children being unprepared to read and comprehend expository text when informational books become an important component of the curriculum. However, contrary to teacher beliefs, results of the following research studies provide evidence that young children can learn to read informational text and that, when given a choice, often prefer to read informational text over narrative text.

Kindergartners' response to informational text. In Pappas's (1993) seminal study, kindergartners' pretend readings and retellings of stories and informational books were documented. The data in this study indicate that young children are able to sustain co-referentiality (the author refers to a character using pronouns or articles e.g., he, his him, the boy) in stories and co-classification (a noun serves as different function, e.g., squirrel representing a class of squirrels) in informational books. They are also able to acquire vocabulary knowledge through the written text of the two respective genres. In their retellings and pretend readings, the children utilized textual properties of expository text such as timeless present-tense verbs, generic noun structures and retained the relational processes of information presented in the text. Consistently throughout this study, the children preferred the informational books, when given a choice, which contradicts the belief that young children prefer narrative books over informational books. Casbergue and Plauché (2003) support this notion by documenting their research showing that, at least through third grade, children are likely to state a preference for informational books when given the choice. The results of the following studies indicate that young children, as early as first grade, can learn to read with informational texts.

Need for informational texts in the classroom. Duke, Martineau, Frank, and Bennett-Armistead (2003) argue for the use of informational books in primary grades. In their study, first grade students whose teachers included more informational text in their classroom libraries, wall displays and school activities showed growth on standardized tests of decoding and word identification that was equal to those students whose teachers focused less heavily on informational texts. For classes whose students entered school with relatively low letter-sound knowledge, those exposed to more informational text actually had higher growth in this area. Other benefits were documented in this study, such as more proficient informational writing and an increase in preference for informational text for recreational reading. Casbergue and Plauché (2003) support the notion that the genres children are exposed to influence their language learning and writing development; young children in first and second grades can learn to read by reading to learn.

Duke, Bennett-Armistead, and Roberts (2003) further support the need for informational text in the classroom. They state that informational text may build background knowledge, vocabulary and comprehension skills which, in turn may support reading in all genres. Many children have a high interest in informational text and that the presence of informational text in the classroom may motivate children to read or to read more productively. Also, informational text is read widely outside of schools and the presence of informational text in the classroom may help children make links between home and school literacies and develop a more comprehensive understanding of what counts as literacy (Duke, Bennett-Armistead, & Roberts, 2003).

Availability of informational text in the classroom is essential to expose students to the informational text genre and to provide the students with the opportunity to explore literature that contains information in which they are interested. However, to be successful informational text readers, students need to be taught strategies that support informational text reading comprehension.

Reading Strategies That Support Expository Text Comprehension

Three core instructional strategies were selected as the focus for this study. These instructional strategies were presented during the professional development workshops and the teachers were asked to implement them during science textbook reading. The strategies were: (a) instruction for recognizing and utilizing rhetorical structure of informational text, (b) instruction in teaching key vocabulary terms that impact meaning and teaching non-technical vocabulary terms that facilitate relationships among ideas, and (c) instruction in utilizing graphic organizers to display core vocabulary terms within context, to display key concepts and their relationships and to facilitate summarization of the content read.

The rationale for selecting these strategies was based on evidence found in empirical research studies. Further, Mastropieri, Scruggs and Graetz (2003) in their review of reading comprehension instruction research found studies that incorporated “packages of strategies” yielded the highest effect sizes (1.33). The group of reading strategies that yielded the highest effect sizes in their study included, text-structure based strategies, finding the main idea, and summarizing. The review of research literature on these specific reading comprehension strategies follows.

Informational Text Comprehension Barriers

Rhetorical structure. "A text's pattern of organization is the larger ideational framework that binds together its complex system of paragraphs" (Readence, Bean & Baldwin, 2000 p. 47). This pattern or macrostructure in expository text differs from the macrostructure of narrative text and is often found in one of the following formats: main idea/detail, cause/ effect, time order, enumeration, and problem/solution. With the assumption authors of content area books write to inform students, Alvermann and Boothby (1983) developed 4 maxims that when followed produce "considerate" text or text that enables readers to gain information easily. The four maxims of considerate text: (a) structure – a plan for how ideas are arranged and connected in text, (b) coherence – the clarity of relationships among ideas both within and across sentences and paragraphs, (c) audience appropriateness – a match between what the reader already knows and what the text purports to teach, and (d) unity – the degree to which only relevant information is included to support the author's assumed purpose. When text does not follow the four maxims, or is "inconsiderate," extra demands are put in the reader's cognitive effort, skill, and/or prior knowledge in order to compensate for the author's negligence to one or more of the four maxims (Ae-Hwa, Vaughn, Wanzek, & Wei, 2004; Alvermann & Boothby, 1983).

Content-area textbooks are often inconsiderate with an unclear relationship among ideas both within and across sentences and paragraphs (Alvermann & Boothby, 1983). For example, in a chapter on a specific topic in a science textbook, the text structure can vary from paragraph to paragraph; when encountering these varying rhetorical structures within a small section of this text, organizing, analyzing and remembering the information in the section becomes a challenging task for children. They have little prior experience with expository text, its structure and how it differs from narrative text. This limited knowledge impedes children's ability to read and understand their content-area texts. The rhetorical structure of expository text confuses them and they struggle in making sense of what they read and in recalling what they have read. Children's knowledge of narrative text structure cannot be applied to expository text structure. Students require explicit training in reading strategies which supports identification and understanding of the rhetorical structures of expository text so they are able to comprehend their content-area textbooks (Duke, 2000).

Concept density. Comprehension of expository text is not limited to knowledge of rhetorical structure; expository text often contains a high density of concepts making it difficult for children to digest what they have read and sift through the information (Merkley & Jefferies, 2001). The results of a study by Alvermann and Boothby (1983), indicate students who had not received instruction in a comprehension strategy (graphic organizers) recalled 26% of irrelevant ideas in a social studies text as compared to students who recalled only 11% of the total number of irrelevant ideas after learning the instructional strategy. By comparison, experimental subjects retained nearly three times as many of the relevant ideas units as the control subjects. The concept density in informational text makes it difficult for students who have no strategy training to separate relevant information from irrelevant information (Alvermann & Boothby, 1983).

Vocabulary development. “Vocabulary is the essential element of comprehending concepts in content areas. Many words used in science content-area materials are used to define concepts and to increase the conceptual development of the content area” (Young, 2005, p. 12). Merkley and Jefferies (2000) state vocabulary knowledge is essential to concept learning and vocabulary knowledge impacts comprehension of the intended meaning. However, vocabulary load in informational books contributes to the difficulties young children have in comprehending expository text. The domain-specific words (e.g., metamorphic rock, amphibian, metamorphosis, barometric pressure) are often technical, raise the readability level of the textbook and impede comprehension (Harmon, Hedrick, & Wood, 2005). Non-technical vocabulary signal conceptual relationships among ideas (e.g., same as, different from, is the result of), and the reader must be able to read and understand these connector words in order to comprehend concepts across sentences and paragraphs (Merkley, & Jefferies, 2000). Graves (1986) suggested words differ from each other in ways that affect instruction. He grouped words into three categories: (a) words already in the student’s oral vocabulary which she needs to learn to recognize in print, (b) words not in the student’s oral vocabulary but are labels for familiar concepts, and (c) words not in the student’s oral vocabulary that refer to concepts new to the students. Science technical vocabulary words often fall in the last category where a definition or brief explanation is unlikely to facilitate student learning. Students learn these complex concepts through repeated encounters in different contexts with many connections made to examples of these concepts (Spiro, Coulson, Feltovich, & Anderson, 2004).

The extent of a reader's vocabulary is related to their comprehension skills (Pressley, 2000). The link between comprehension and vocabulary development is strengthened when the reader makes deep and extensive connections between vocabulary words and their meanings (Pressley, 2000). Learning requires multiple exposures over an extended period of time as opposed to rote learning (Harmon, Hedrick, & Wood, 2005; Readence, Bean, & Baldwin, 2000; Stahl, 1986). Most vocabulary words are learned through contextual encounters, but studies where vocabulary was explicitly taught revealed the causal role of vocabulary knowledge in the development of comprehension skills (Pressley, 2000). Vocabulary knowledge, whether learned through explicit instruction or multiple encounters in text, is an essential component in the comprehension process.

Text Structure Instruction

Expository reading is important to increase the reader's breadth of worldly knowledge and vocabulary knowledge (Pressley, 2000). Expository text is written specifically to communicate information, facts, and ideas; a common goal of expository reading is to locate information (Merkley & Jefferies, 2000). Symons and Pressley (1993) state that fifty to eighty percent of occupational reading tasks require finding information in text. The information in expository text structure contains the complex organization of concepts arranged in a certain order so that relationships among ideas are conveyed (Merkley & Jefferies, 2000). Students require instruction in attending to and uncovering text structure; it is essential they know the differences between informational text and other kinds of text (Duke, 2004). “Proficient readers of informational texts are actively engaged and purposeful in their reading; attend to both the external physical organization of text and its internal structure; and employ a range of strategies designed to facilitate their understanding of this text type” (Ogle & Blachowicz, 2002 p. 30). To facilitate proficient reading and comprehension of expository text, students should be taught how to identify the organizational structure or macrostructure of the text (Armbruster, Anderson, & Ostertag, 1987; Berkowitz, 1986; Taylor, 1980).

Children’s comprehension and retention of expository text content is facilitated by the development of strategies that support the recognition and understanding of the various types of expository text macrostructures; children who have learned these strategies perform better in text recall than students who do not have this knowledge (Alvermann, 1988; Alvermann & Boothby, 1983; Armbruster, Anderson, & Ostertag, 1987; Griffin, Malone, Kameenui, 1995; Horton, Lovitt, Bergeruod, 1990; Radcliffe, Caverly, & Peterson & Emmons, 2004; Taylor, 1980; Taylor & Beach, 1984). Armbruster, Anderson and Ostertag (1987) suggest that direct instruction in using an author’s organization of ideas in content material for study improves recall of expository information. This study indicates that strategy acquisition has transfer effects, which was also shown in Bakken’s study (1997). Bakken found that students who were taught to identify the organization (main idea/detail; main idea followed by a list; main idea followed by ordered steps) of specific expository passages statistically outperformed students in the control condition, (paragraph reinstatement), in recall of the information in both science and social studies passages regardless if the test was administered immediately following training or 24 hours after training or whether the task involved an entirely different content area. Bakken's (1997) study supports the notion that the first step in facilitating students' expository text reading comprehension and the development of an informational text schema is direct instruction in expository text rhetorical structure.

Kintsch and van Dijk (1978) suggest that knowledge of rhetorical structure is important in comprehension processes. Readers who possess informational text organization schemata, (complex relational structures where knowledge is stored), can understand the relationship among and across ideas presented in the informational text they are reading. Knowledge of text structure facilitates the readers' ability to sift through the information to select the relevant facts and organize them into meaningful units for recall. Aligning with Pressley, El-Dinary and Gaskin's (1992) model for self-regulated readers, instruction begins with an introduction to a specific text structure of the target text passage by utilizing a curriculum-free example, identifying its organizational characteristics and exemplifying the organization by graphically displaying the key concepts and their relationships. The introduction includes teacher-modeling the identification of key technical terms (e.g., different from, same as) that signal specific expository text organization and instruction in the meaning of the technical terms and how they signal specific relationships by presenting examples written within appropriate context. Next, the teacher provides an opportunity for student-practice in identifying expository text structure in content-bound, curriculum-free text. Guided practice in subsequent curriculum-bound lessons is provided, with gradual release of the responsibility to the students as they collaborate first in small groups, then pairs and eventually working independently. The significance of this instructional design is the teacher-modeling and subsequent guided practice before the students engage in curriculum-based content area reading. The design is supported by Mayer's (1996) notion that strategy instruction should focus on process not the product. Components of the instructional design include students learning to graphically represent the core concepts and the relationships among them after reading the target passage in their content-area text.

Graphic organizers. Graphic organizers are visual and spatial displays designed to facilitate the teaching and learning through the use of lines, arrows, and spatial arrangement that provide visual depictions of key terms and concepts and the relationships among them (Ae-Hwa, Vaughn, Wanzek, Wei, 2004; Simmons, Griffin & Kameenui, 1988). Graphic organizers were originally called advanced organizers (or structured overviews). Ausubel and Fitzgerald (1962) were the first to research their effects in reading and comprehending content-area text, arguing that an individual's existing knowledge or cognitive structure is a major variable in learning new material in content-area reading. Utilizing structured overviews as a teacher-directed readiness activity clarifies and organizes a learner's prior content knowledge so that information can be assimilated efficiently (Merkley & Jefferies, 2000). Results from Ausubel and Fitzgerald's (1962) study indicate that new ideas and information are learned and retained most efficiently when specific and relevant ideas are already available in the cognitive structure; the purpose of the advanced organizer bridges the gap between what the learner already knows and what he needs to know so he can learn the task at hand (Ausubel, 1980). Ausubel's work is the basis for numerous studies on visual representations of content-area reading material.

In a meta-analysis of 23 quantitative graphic organizer studies, Moore and Readence (1984) computed 161 effect sizes and found learners creating graphic organizers outperformed learners in control-group situations with effects varying according to treatment condition; graphic organizers presented before the learning task averaged a small effect size (.27), graphic organizers presented with supplemental questions, study guides or small group discussions resulted in a very small effect size (.08), and graphic organizers presented after the learning task constructed either by the learner or teacher resulted in a medium- average effect size (.57). Post graphic organizers resulted in an average effect size that was .30 standard deviations higher than the average effect size for advance organizers and both effect sizes were higher than that for the supplemental treatment condition.

Other studies support this notion. Alvermann (1981) found that graphic organizers facilitate readers in making connections among sentences which results in greater reading comprehension. The results of this study indicate that organizers facilitate recall performances when readers are required to reorganize information found in text. Even more beneficial, Broer, Aarnoutse, Kiet, and Van Leeuwe (2002) revealed transfer effects. During a systematic lesson series, students were taught to make graphic organizers in which the main points of the text are aligned with the text structure (classification structure and causation structure.) The experimental lesson series proved to have a positive effect on the students' ability to infer the main idea of text and spontaneously apply the graphic organizer-making strategy. Students taught using the experimental lesson series had greater recall of the text than the students in the control condition where traditional methods (students reading the text and then answering a set of various questions related to the text) were implemented.

Constructing graphic organizers to visually organize underlying concepts in content-area textbooks into meaningful units actively engages students in reading and promotes comprehension (Broer, Aarnoutse, Kieviet, & Van Leeuwe, 2002). Best practices for graphic organizer construction follow the gradual release-of-control model (Pearson & Gallagher, 1983). Mayer (1996) advocates the teacher models graphic-organizer making and then provides scaffolded instruction by having students construct their own organizers and compare their results to an expert – the teacher. Berkowitz (1986) found that students who constructed their own organizers using the authors' organization of ideas of content material resulted with the best total free recall of textbook passages than the students in the control conditions: (a) reading the text and writing out the answers to 20 probes, and (b) rereading the material and silently reviewing per specific instructions on this procedure. Merkley and Jefferies (2000) suggest that the effects on comprehension are increased when graphic organizers are, at least, partially constructed by students as a during-reading or post-reading activity. Empirical evidence indicated in the Report of the National Reading Panel, (2000) indicates teaching students to organize the ideas they are reading about in systematic visual graphics benefits the ability of the students to remember what they read and may transfer, in general, to better comprehension and achievement in social studies content areas. The Report of the National Reading Panel (2000) calls for further research to discover if instruction in comprehension strategies, such as graphic organizers, leads to learning skills that improve performance in content-area reading.

Graphic organizers to support summarization. The main purpose of reading informational text is to locate and learn information (Merkley & Jefferies, 2000). Students are frequently expected to recall main ideas and concepts from assigned reading passages and to provide support for their decisions. To do this, students must process the content and decide which concepts are most important -- a task that may be difficult when the text is inconsiderate or has poor relationships across and among ideas in sentences and paragraphs (Alvermann & Boothby, 1983). Students need to possess strategies to sift through the information and determine which ideas are relational to the main idea and condense and organize them into meaningful, coherent concepts (Fisher & Frey, 2007). Researchers have found that teaching students in regular education classrooms how to summarize expository text after reading has resulted in improved comprehension and memory of the information (Rinehart, Stahl, & Erickson, 1986; Taylor & Beach, 1984). Mastropieri, Scruggs and Graetz's (2003) review of reading comprehension instruction research found studies that incorporated self-questioning strategies, such as summarizing, yielded the highest effect sizes (1.33). Summarization is an essential skill for recall and comprehension.

Other studies indicate the effectiveness of graphic organizers on students' abilities to summarize. DiCecco and Gleason (2002) found that graphic organizers aid students in recalling relational knowledge as opposed to recall of facts and supports students in summary writing. Hall, R., Hall, M., & Saling (1999) found that when graphic organizers were utilized for summarization, students recalled significantly more information two days later than the other groups that did not utilize graphic organizers for summarization. They concluded the organizers apparently provided the students with sufficient cues to organize the information to be learned into a coherent organization conducive for subsequent recall. Teaching students to utilize graphic organizers to organize key concepts found in informational test has been effective in supporting students' ability to summarize and recall information.

Vocabulary Development

The extent of a reader's vocabulary is related to their comprehension skills (Pressley, 2000). The link between comprehension and vocabulary development is strengthened when the reader makes deep and extensive connections between vocabulary words and their meanings (Pressley, 2000). Learning vocabulary requires multiple exposures over an extended period of time as opposed to rote learning (Readence, Bean, & Baldwin, 2000; Stahl, 1986). Most vocabulary words are learned through contextual encounters, but studies where vocabulary was explicitly taught revealed the causal role of vocabulary knowledge in the development of comprehension skills (Pressley, 2000). Vocabulary knowledge, whether learned through explicit instruction or multiple encounters in text, is an essential component in the comprehension process.

Vocabulary instruction. Principles of vocabulary instruction (Stahl, 1986) emphasize that new vocabulary be taught not only by definition but within context; deep processing translates into active engagement with words and concepts (Harmon, Hedrick & Wood, 2005; Readence, Bean, & Baldwin, 2000; Stahl, 1986). Vocabulary instruction can take many forms, including structural analysis of meaning-bearing units within words, but primary to vocabulary acquisition is multiple exposures of the key terms (Alvermann & Hague, 1989). Vocabulary learning through engagement and deep processing is essential to the comprehension of expository text and goes beyond looking the word up in the dictionary and writing the definition. Harmon, Hedrick and Wood (2005) state that effective practices for promoting vocabulary focus on the importance of impacting comprehension, not word knowledge alone.

Harmon, Hedrick and Wood (2005) suggest several features of effective vocabulary instruction. First, instruction must relate newly acquired words to other words and concepts. This feature suggests the importance of the interrelationships among words and the importance of connecting new learning with existing knowledge. This notion aligns with the principles proposed by Stahl (1986) which state vocabulary instruction includes deep processing that translates into active engagement with words and concepts, making connections between the new words and prior knowledge, and making connections between the new word and different contexts. The second feature, repetition, refers to the need for students to not only acquire new word meanings but to also have sufficient practice in using the meanings so that the meaning can be automatically accessed during reading. The third feature of effective vocabulary instruction, *meaningful* *use*, is connected to the level at which students are actively engaged in using the word meanings. Harmon, Hedrick and Wood (2005) believe that the higher the level of processing, the more likely students will learn and retain word meanings. For example, terms found in content area textbooks may have multiple meanings with one meaning being specific within the context of the textbook passage. According to Kamil & Hiebert, (2005) domain specific terms appear thirty times within a million words. When students encounter these infrequent words, they will learn and retain their meaning when they process the meaning within the context of the passage as well as process the words' multiple meanings in various contexts.

Studies indicate that explicit instruction positively impacts vocabulary acquisition (Beck & McKeown, 1991; Blachowicz & Fisher, 2000; Graves, 1987; Stahl and Fairbanks, 1986). Vocabulary instruction can be addressed in pre-reading activities where students have the opportunity to activate and build important background knowledge about concepts and the terms associated with the concepts (Harmon, Hedrick and Wood, 2005). An example of a pre-post reading instructional strategy -- *Possible Sentences* (Stahl & Kapinus, 1991) -- was found effective in helping students learn science vocabulary and in recalling facts and in recalling facts about the concepts. (*Possible Sentences* is an activity where the teacher selects 6 to 8 words from the text that may cause difficulty in student comprehension. The teacher also chooses 4 to 6 words that are likely to be familiar to the students. Using the selected 10 to 14 words, the students create possible sentences that might be found in the text they are about to read. Thus, P*ossible Sentences* is a method of predicting word meaning within the context of a sentence. After the text is read, the students check the possible sentences for accuracy of their predictions.)

Instructional strategies for vocabulary learning can take place during class discussions. Stahl and Clark (1987) investigated the effects of discussion on the science vocabulary learning of fifth grade students. They found that discussion proved to be more effective in vocabulary learning than having no discussion about the words. Lloyd and Contreras (1985) investigated whether hands-on experience along with teacher and student interactions would increase the vocabulary knowledge and reading comprehension of fourth-grade students as they read science texts. When compared to traditional dictionary work, the students who engaged in the hands-on/discussion instruction performed significantly better than the dictionary group and a control group that received no special instruction.

Graphic organizers can be utilized in vocabulary instruction. The Report of the National Reading Panel (2000) found the multimedia method of vocabulary instruction as an effective instructional strategy. With the multimedia method, "vocabulary is taught by going beyond text to include other media such as graphic organizers…" (Report of the National Reading Panel, 2000, p. 4-18). Graphic organizers can serve as a reference point for putting new vocabulary and main ideas into orderly patterns (Merkley & Jefferies, 2001) by making meanings and relationships visible (Blachowicz & Fisher, 2007). As key items are conceptually organized on a graphic organizer, new vocabulary can be reinforced by their placement within the appropriate context of the key concepts and provide a memory organizer for later use (Blachowicz & Fisher, 2007). For example, a fourth grade semantic feature analysis chart for animals, the key vocabulary word, "amphibian" would be placed under the heading "Animal Type." The characteristics of an amphibian would be identified under subsequent headings: Type of Skin (thin and moist); Reproduction (lays eggs, tadpoles hatch, tadpoles mature into adults); Habitat (near ponds and lakes); How Oxygen Enters the Body (gills when tadpoles; lungs when adults); Source of Food (insects). By utilizing the semantic feature analysis chart, a reader could develop the understanding that an amphibian is a kind of animal that lives near ponds or lakes, eats mainly insects, has smooth moist skin, reproduces by completing a life cycle by laying eggs which hatch into tadpoles and then matures into an adult, and breathes with gills when a tadpole but breathes with lungs as an adult. This particular semantic feature analysis map would also be conducive to teaching the term "metamorphosis" to describe the life cycle of amphibians.

Bos, Anders, Filip & Jaffe (1989), conducted a study with 50 students identified as having learning disabilities and reading 3 to 7 years below grade level. The students in the experimental condition utilized a semantic feature analysis chart to predict relationships between new and old knowledge represented by the concepts and vocabulary on the chart. The students read the passage, engaged in discourse and them confirmed or clarified their predictions after which they modified their semantic feature analysis chart. In the control condition, the dictionary method, the students used dictionaries to generate definitions after the teacher-researcher conducted a short discussion on the topic of the passage. After the students defined the vocabulary, they read the passage to verify and/or clarify the meanings of the words. Students in both conditions were given reading comprehension tests that consisted of 20 multiple choice items of which 10 were vocabulary. The results indicate that the semantic feature analysis group had higher initial conceptual and vocabulary scores than the dictionary method group as well as higher conceptual and vocabulary scores when they were tested 6 months later. The results of this study support the notion that utilizing graphic organizers for vocabulary instruction is effective.

Non-technical vocabulary instruction. Teachers typically assume that students understand non-technical words (Harmon, Hedrick, & Wood, 2005). However, Marshall and Gilmour (1991) found that many New Guinea students in grades 7 -12 had a superficial level of understanding for non-technical words (e.g., same as, different from, is the result of), resulting in an inability to effectively communicate science ideas to others during class. Instructional strategies that teach students the meaning and application of non-technical terms to understand how ideas and concepts are connected across sentences and paragraphs will, in turn, facilitate students' comprehension of core science ideas presented in content-area textbooks. The rhetorical structure of informational text often follows one or more of the following formats: compare/contrast, main idea/detail, cause/ effect, time order, enumeration, and problem/solution. Often key technical terms signal the format or relationships of ideas presented in the text; i.e., the terms "be similar to" or "be different from" signal compare/contrast; the terms "first, second, third", etc. signal order of facts or time order; the terms "as a result of" and "arise from" signal cause and effect. Comprehension of non-technical terms facilitates the reader's understanding of the rhetorical structure that leads to the reader's ability to organize the ideas presented in the text into meaningful units for recall. Instruction in non-technical vocabulary is directly related to instruction in recognizing rhetorical structure; in order to identify the text structure of passages, the reader needs to comprehend the vocabulary terms that signal each specific structure.

Professional development workshops can facilitate change in teachers' instructional strategies in content area reading comprehension. Trends in professional development have changed over time with the current focus on school goals and teachers' priorities. The following is a brief history of professional development and the evolution of Guskey's (1986, 2002) model for professional development used in this study.

Professional Development

History of professional development. Historically, professional development in education has been characterized by disorder, conflict and criticism (Guskey, 1986; McLaughlin & Berman, 1977; Richardson & Placier, 2001) and has frequently not aligned with school priorities or teachers' needs (Guskey 2003a). Further, history marks professional development as a pendulum moving back and forth in decision-making between centralized and decentralized governance in schools (Cuban, 1990). The centralized governing authorities, in their roles as change agents, based decisions on recent educational trends, personal agendas, (Corcoran, Fuhrman, & Belcher, 2001), and their theories of teacher learning and instructional change; they "were more interested in designs that drew on research about practices that they already felt were 'good' than in designs that were producing results" (Corcoran, Fuhrman, & Belcher, 2001, p. 81).

B.F. Skinner's behaviorist theory dominated the centralized change agents' perspective; teaching is learning and learning is remembering (Spilanne, 2002). When centralized authority dominated as change agents in education, schools and teachers made few, if any, contributions in the decision-making for school reform and professional development, often resulting in incongruent workshops remotely connected to classroom instructional practices and student achievement (Guskey, 1986).

The movement from centralized control in professional development began in the 1980's when reform proposals were influenced by the research literature that focused on schools as the unit of change and by corporate executives who pointed to their organizations where decision-making occurred at the site where products were made or services delivered (Cuban, 1990). As schools and teachers gained a voice in decision-making for school reform, they were impacted by the demands of the 2001 No Child Left Behind Act (NCLB) legislation (Public Law No 107-110). This federal law impacted leaders in professional development who have to meet the requirement for "scientific", researched-based programs with a strong emphasis on accountability as defined in terms of student improvement (Guskey, 2003a). Current research literature has resulted in professional development models that place the district, the school and teachers as partners in professional development design, goal setting and evaluation with increased student achievement as the foremost outcome (Guskey, 1986). Present professional development models include skill progression, understanding instructional practice (Dall'Alba & Sandberg, 2006; Darling-Hammond, 1995; Jetton & Alexander, 1997), student assessment, and consideration of the context in which instruction and learning take place (Guskey, 2003a; Porter & Brophy, 1988). However, changing the training paradigm that dominates school districts' approach to professional development will necessitate a challenge to district officials' theories about teacher-learning (Richardson, & Placier, 2001; Spillane, 2002).

Guskey's (1986) model of professional development dominates the research literature. He believes that professional development begins with the teachers establishing goals - desired learning outcomes of their students. When the teachers are part of the goal setting process they have a personal investment and are motivated to participate in the workshops and apply what they have learned in the classroom setting. The second crucial point in Guskey's (1986) model is teacher-change is based on the ideas that change is a learning process for teachers that is developmental and experientially-based. Teachers' attitudes and beliefs towards new instructional practices change when student achievement improves as a result of these applied practices. They believe that the instructional practices have value because they observe the effects in terms of student achievement which in turn motivates them to continue utilizing the newly learned instructional practices.

The following review of literature includes the work of not only Guskey, but several authors to provide a deep and broad understanding of essential features for effective professional development workshops. The review of literature is concluded with a study (Duffy, 1993) that describes the progression of the characteristics of teacher change in implementing reading strategies.

Definition and purposes of professional development workshops. To quote Benjamin Franklin, "There is nothing certain except death and taxes." Roettger (2006, p. 18) adds, "The third certainty is *change*." She continues, "Change with no improvement is one of the 10 root causes of frustration for America's schools" and "Change must be synonymous with improvement" (Roettger, 2006, p. 19). Guskey, (1986) states that high quality staff development is a central component in nearly every proposal for improving education. The central purpose for successful professional development workshops is to facilitate change in teachers' beliefs and attitudes towards instructional practices; to facilitate teacher-change, the workshop components must be multifaceted and carefully planned. The purposes of the professional development workshops are: (a) to increase teachers' understanding of student learning processes, (b) provide opportunities to learn and implement instructional practices that develop the learning processes, and (c) guide teachers to effectively assess student achievement (Guskey, 1986). The following literature review summarizes the essential components for successful professional development workshops

Features of Professional Development Workshops

District and school support. Before the onset of the professional development workshop series, it is essential that the professional development leader obtain support from the school district and the building principal. The teachers' success in the difficult and serious tasks of learning and implementing new skills and perspectives depend upon support from the district and school's governing personnel (Darling-Hammond, 1995). The success of teacher-change hinges on a collaborative school culture that focuses on improvement (Guskey, 1986). McLaughlin and Berman (1977) label school principals as "gatekeepers of change." Principals are instrumental in facilitating change in attitudes; that teachers realize their new and shared responsibilities are part of their customary roles. Principals must offer leadership that influences, facilitates and manages the change process (Guskey, 1986; Roettger, 2006).

Participants. Professional development workshops are successful when the teachers who are interested learning new instructional practices that facilitate student learning volunteer to participate as opposed to being required to attend (Duke, 1990). When teachers are self-directed this leads to immersion and reflection; they have a personal investment. When the school's principal participates in all workshops, she not only becomes knowledgeable of the content but is able to support the teachers as they implement new instructional practices in their classrooms; they participate as change agents through encouragement and participation in the evaluation process. Collaboration between teachers and principals creates a strong team effort in school reform (Roettger, 2006).

Duration. Guskey (2006) states that extended time provided for professional development which is structured carefully and used wisely, engaging educators in activities, yields improved results. The duration of a professional workshop series requires time for collaborative goal setting, instructional sessions, and time for practice and planning. Research indicates that activities of longer duration have more subject-area content focus, more opportunities for active learning and more coherence with teachers' existing beliefs and practices than do shorter activities (Birman, Desimone, Porter, & Garet, 2000; Lefever-Davis, Wilson, & Moore, 2003).

Coherence. "Education experts frequently criticize professional development on the grounds that the activities are disconnected from one another: an activity is more likely to be effective in improving teachers' knowledge and skills if it forms a coherent part of a wider set of opportunities for teacher learning and development" (Birman, Desimone, Porter, & Garet, 2000. p. 31). Spillane (2002) conducted a mixed-methods study to examine school district's policies on teacher change. He found that professional development typically involves short-term activities that involve little coherence or coordination. Birman, Desimone, Porter, & Garet (2000) surveyed more than 1000 teachers who participated in professional development sponsored by the federal government's Eisenhower Professional Development program. They found that coherence of professional development is directly related to increased teacher learning and improved classroom practice. "By engaging teachers in active work, and by fostering a coherent set of learning experiences, a professional development activity is likely to enhance the knowledge and skills of participating teachers" (Birman, Desimone, Porter, & Garet, 2000. p. 29). Therefore, consecutive workshops need to occur through regular intervals throughout the time allotted for professional development and need to be designed to build on one another but at the same time allow time for clarification of content presented in previous workshops and/or adjustments made to meet the specific teacher's needs.

Collaboration. The context for support is crucial in a professional development series that has teacher-change as one of its goals (Duke, 1990). According to Roettger (2006), collaboration among peers and principals during professional development is necessary. Collaboration enables teachers to discuss concepts presented during the professional workshops and to address problems that arise during the implementation of newly learned strategies in the classroom. Collaboration gives teachers the opportunity to integrate what they learn with other aspects of their instructional content, to share common curriculum materials, course offerings and assessment requirements. Collective participation may also contribute to a shared professional culture in which teachers in a school develop a common understanding of the instructional goals, methods, problems and solutions (Guskey, 2003b; Lefever-Davis, Wilson, & Moore, 2003).

Order of content. The order of the content presented in the workshops closely aligns with backward planning suggested by (Guskey 2003a). Planning by staff developers tend to be event-driven and process-based; they plan what they are going to do and how they are going to do it. Guskey (2003a) suggests that to meet the requirements of No Child Left Behind Act (NCLB) legislation (Public Law No. 107-110), staff developers plan backwards beginning with the identification of student learning goals they want to attain. The introductory step will be a collaborative effort in establishing the desired student learning goals to be achieved. Staff development is most powerful when it focuses on results that can be expressed in terms of student achievement (Guskey 2003a; Rude & Brewer, 2003).

To achieve the student learning goals, teachers need to be provided with explicit instructional practices, knowledge and skills. It is essential that teachers have a sophisticated understanding of content and how children learn when they are expected to teach to new standards by implementing newly learned strategies in their classrooms (Birman, Desimone, Porter, & Garet, 2000). The workshops should include not only theory but practical application of theory by providing instructional practices that guide students through the learning processes.

Reflection. Due to a limited amount of time in a teacher's day coupled with the multiple responsibilities of classroom instruction, teachers seldom make time for written reflection. When teachers act on improving their instructional practices, they become aware of their strengths and what is needed to make them "smarter" about effective teaching. Once teachers have decided to monitor the effects of their teaching, the awareness of their own strengths and needs help teachers to act on improving practice. It is the monitoring that is critical (Wold, 2003; Darling-Hammond, 1995).

Assessment. To effectively measure student learning goals established during the initial phase of the professional development workshops, student assessment that aligns with specific instructional practices is essential. The results of assessments serve as meaningful sources of information for students and, through reflective thinking, assessments provide a guide for teacher instruction (Guskey, 2003c). The results of student assessments influence change in teachers' instructional practices. Guskey's (1986) model states that teachers' beliefs and attitudes towards new instructional practices will change when they observe positive student learning outcomes.

Active learning. Teachers who have opportunities for active learning during professional development report increased knowledge and skills and changes in classroom practices (Birman, Desimone, Porter, & Garet, 2000). Active learning includes opportunities to observe and be observed teaching such as practicing in simulated conditions, guided practice in planning classroom implementations and active participation in group discourse (Birman, Desimone, Porter, & Garet, 2000). Professional workshops need to provide opportunities for the participants to be active learners by providing them with time to practice new instructional strategies with peers and to plan specific lessons for their classrooms.

Literacy Coaching

Goals from the No Child Left Behind (NCLB) legislation include helping teachers improve their literacy skills and gain new effective reading instructional techniques. As a result, the use of literacy coaching in schools has been encouraged as a viable method to provide sustained and effective professional development to support teachers in Reading First Schools (Denton & Hasbrouck, 2009). (Reading First, program in NCLB was designed to support young students' achievement in schools in which many students have reading difficulties and are economically disadvantaged. L'Allier, Elish-Piper and Bean (2010) synthesized the findings from their studies on coaching to develop seven guiding principles for literacy coaches.

Principle one: coaching requires specialized knowledge. Literacy coaching includes providing large group presentations, facilitating small teacher-study groups and grade-level team meetings and supporting individual teachers. These activities revolve around knowledge of literacy processes, acquisition, assessment and instruction. Therefore, the literacy coach must have a strong knowledge base around the various aspects of literacy education.

Principle two: time working with teachers is the focus of coaching. To provide ongoing professional development for teachers, literacy coaches spend time with teachers by observing, modeling, conferencing, co-teaching and leading book study groups.

Principle three: collaborative relationships are essential for coaching. Student achievement is a goal shared between literacy coaches and teachers. The foundation for collaboration to achieve this goal is built on trust, confidentiality and effective communication with the teachers.

Principle four: coaching that supports student reading achievement focuses on a set of core activities. Elish-Piper and L'Allier, 2007 found that when literacy coaches administer and discuss student assessments with teachers, observe teachers' instruction and offer supportive feedback, conference with the teachers about their instruction and students and model instruction in classrooms, student achievement in reading increases significantly more than in comparable classrooms where these coaching activities are not provided.

Principle five: coaching must be both intentional and opportunistic. Intentionality is critical to the success of literacy coaches. The coach must have a plan for working with each teacher that is deliberate but flexible. The coaching plans vary in relation to each teacher's background knowledge and teaching experience.

Principle six: coaches must be literacy leaders in the school. Effective literacy coaches are frequently involved in setting the goals or directions of the school and coaching teachers to facilitate goal achievement. They lead the redesigning of a school's curriculum and instruction to meet the school's achievement goals. Their leadership includes supporting teachers' professional growth by working collaboratively with small groups or individual teachers.

Principle seven: coaching evolves over time. Some literacy coaches have a great deal of teaching and collaborative experience. They enjoy working with adults and have leadership and interpersonal skills as well as in-depth knowledge about literacy and instruction. However, for novice coaches who are facing an uncertain agenda may struggle as they learn to develop positive relationships with teachers and modify their plans of action as they evolve as literacy coaches.

Teacher Change

The results of a longitudinal study conducted by Duffy (1993) describe teacher change in terms of a progression of teacher characteristics on a 9 point continuum. The teachers participated in a four-year professional development program to learn reading strategies to teach to their lowest achievers. Qualitative data was gathered through interviews and direct classroom observations and consistencies among the data were used to develop the continuum. A description of the points on the continuum follows.

Point 1 on the continuum is characterized as teacher confusion and rejection of the new strategies because they strongly believe they must follow directives in the basal reader's teachers manual. Point 2 is characterized by the teacher implementing the strategies with the basal readers but not sharing strategy thinking with their students. Point 3 of the continuum is characterized by the teacher naming the strategy and informing the students how the particular strategy will facilitate their reading; strategies were taught in isolation of text reading. Teachers who reached point 4 related specific reading strategies with the text but did not teach their students to procedural knowledge or how to apply the strategy in all reading situations including those outside of school. When teachers reached point 5, "the wall," they had difficulty understanding the complexity of strategy implementation; they desired a "formula" or lists of approved strategies that could be easily implemented.

"Over the Hump," point 6 is characterized by teachers breaking away from directives in teacher's manuals, developing units of inquiry which required student research, reading, and application of strategies; students were learning to become strategic readers. As teachers began to teach more sophisticated strategy combinations, they remained uncomfortable with their decisions and sought reassurance from the professional development leader, point 7 on the continuum. Point 8 is characterized by teachers who were confident in strategy selection and application; they revised strategies and invented new ones. Their students used text for authentic purposes; they were strategic readers, selecting and apply strategies to construct meaning. Point 9 remains unnamed as these characteristics have not been documented. Duffy expected the teachers to continue movement on the continuum; it does not stop at point 8.

Purpose for the Study

Need for this study. The review of the research literature indicates that exposure to informational text with instructional strategies for comprehension are essential in preparation for students' encounter with content area textbooks when academic success is dependent upon their ability to read and understand informational text. A review of the literature indicates numerous research studies that focus on facilitating students' comprehension of informational text through the utilization of graphic organizers. The foci of other studies of informational text reading comprehension include activating prior knowledge and teaching vocabulary terms that impact meaning. Few, if any studies have examined the effectiveness of multiple strategy instruction in combination with graphic organizer utilization (Ae-Hwa, 2004). Furthermore, the intervention in many of these studies has been implemented by the researcher utilizing informational text outside the standard school curriculum. In addition, the focus of many studies has examined the effects of strategy instruction only on the change in students' informational text reading comprehension.

This study was unique in that it focused on change of teacher beliefs and attitudes towards science textbook reading instructional strategies as a result of learning, in a series of professional development workshops, multiple instructional strategies that facilitate students' comprehension of science textbook reading and then implementing these strategies during regular science textbook reading lessons. This study also examined the relationship between teachers' perceptions of student science textbook reading achievement resulting from the implementation of the instructional strategies and the teachers' beliefs and attitudes towards strategy implementation. Specifically, the foci of this study were: (a) professional development workshops that provided teachers with instruction in three specific strategies that facilitate third, fourth and fifth grade elementary students' comprehension of their science textbook, (b) an examination of teacher implementation of the strategies presented in the workshop, (c) an examination of the teachers' perceived effects of the implementation of the instructional strategies on students' reading comprehension achievement, (d) an examination of teacher-change in attitudes and beliefs towards the implementation of the strategies, and (e) an examination of teacher change in pedagogical knowledge of informational text instruction.

Intent of study. The purposes of this study were to qualitatively explore: (a) the relationship between professional development workshops that focus on science textbook reading instructional strategies and the workshop participants' quality and quantity of implementation of the strategies during regular science textbook reading, (b) the teachers' perception of the relationship between strategy implementation and their students' science textbook reading achievement, and (c) the relationship between the teachers' perception of their students' science textbook reading achievement and the teachers' attitudes and beliefs towards the explicit instructional practices. The purposes of this study were also to quantitatively describe the relationship between the professional development workshop series and the teachers' pedagogical knowledge of informational text reading instruction.

Qualitative Research Questions

1. What was the nature of the relationship between explicit instructional strategies presented in a series of professional development workshops and the quality and quantity of workshop participants' science textbook reading comprehension instruction?
2. What was the nature of the relationship between workshop participants' implementation of explicit instructional strategies and their perceptions of students' science textbook reading achievement?
3. What was the nature of relationship between the workshop participants' perceived change in student reading achievement and the participants' attitudes and beliefs towards the explicit instructional practices?

Quantitative Research Question

1. To what degree did the instruction of explicit instructional strategies presented in professional workshops compare to the statistical description of the workshop participants' pedagogical knowledge of science textbook reading comprehension instruction?

Mixed-Methods Research Question

1. How did the data from the quantitative measures support and complement the themes discovered in the qualitative inquiries?

Chapter Three

Methodology

Design

This 18-week case study of teacher-change in implementing science textbook reading strategies focused on third, fourth and fifth grade teachers in a rural setting. The study utilized the triangulation of teacher observations, teacher lesson reflections and teacher interviews to complete the qualitative data collection. The qualitative data explored: (a) the relationship between professional development workshop instruction in explicit science textbook reading comprehension strategies and the quantity and quality of the teachers' application of those specific strategies in their instructional practices, (b) the relationship between the implemented strategies and teachers' perception of students' science textbook reading achievement, and (c) the relationship between the perceived change in students' reading comprehension achievement and teachers' attitudes and beliefs about the implementation of science text book reading strategies. Emerging themes from the qualitative data collection were supported and complimented in the triangulation of the three data collection sources. I utilized descriptive statistics collected from a pre- and post pedagogical knowledge assessment to support the qualitative data collection.

Sampling

Setting. The rural school district in which this study took place is located in a Central Plains state in a town, population 1200. Five surrounding small elementary school districts merged to form a district that now includes one elementary school, Riverton Elementary (pseudonym), one middle school and one high school. The total enrollment of the elementary school was 212; all K-6 students attended school in one elementary school building. Twenty-nine percent of the students in the district qualified for free and/or reduced meals compared to the state's average of 36% (Nebraska Department of Education).

Teachers. Three elementary classroom teachers participated in this study. One third, one fourth and one fifth-grade teacher provided science instruction for students in two respective grade level classes. The third grade teacher had 4 years teaching experience and had earned a Bachelor's Degree in Education; the fourth grade teacher had 36 years teaching experience and had earned a Master of Degree in Education; the fifth grade teacher had 24 years teaching experience and had earned a Master of Arts degree in counseling. The teachers were not ethnically diverse; 100% were Caucasian. The study was confined to one school district, because the science textbook series utilized in this study was adopted district-wide and was utilized in all classrooms.

Students. The current enrollment distribution and demographics for the 6 participating classrooms were as follows: (a) 2- third grade classrooms with a total enrollment of 32 students of which 30 students were Caucasian, one student was Hispanic and one student was African American,(b) 2- fourth grade classrooms with a total enrollment of 39 students of which 37 students were Caucasian and two were Hispanic, and (c) 2 fifth grade classrooms with a total enrollment of 35 students of which 34 were Caucasian and one is Hispanic.

Permission

District permission. I obtained permission from the district superintendent and elementary principal to: (a) conduct professional development workshops for the third, fourth and fifth grade teachers to provide training in instructional reading strategies that support their students' science textbook comprehension, (b) collect primary qualitative data which includes principal and teacher interviews, classroom observations and teacher reflections, (c) collect primary quantitative data which includes pre- and post assessments that measure the teachers' pedagogical knowledge for informational text reading strategies, and (d) write the results for the qualitative and quantitative data analyses in professional publications or for presentations at professional conferences.

IRB approval. The University of Nebraska, Lincoln Institutional Review Board (IRB) granted approval for this research study on July 28, 2008 determining there were no known risks involved for the human participants.

Conditions of participation. The three teachers in this study volunteered to take part in the professional development workshop series and agreed to implement the instructional strategies presented in the workshops. The elementary principal and district superintendent gave written permission for this study to be conducted in the elementary school. The elementary principal allocated time for the professional development workshops and used grant funds to hire substitute teachers for the participants so they could attend the workshops.

Consent forms. I asked the participants to sign a consent form prior to the first professional development workshop. The consent form explained the conditions, requirements and roles of the participants in the study.

Qualitative Data Collection

The format for the qualitative data collection was a case study of the relationship between a series of professional development workshops that presented science textbook reading instructional practices and three rural, elementary school teachers' attitudes and beliefs in relation to their implementation of the strategies. Multiple forms of data were collected following the recommendations of Yin (1989), including, classroom observations, teacher lesson reflections and semi-structured one-on-one interviews with the elementary principal and the three teachers. I triangulated the emerging themes among the three qualitative data sources to determine if the data results supported each other.

Quantitative Data Collection

Teacher assessment. After the initial baseline classroom observations, I gave the teachers an assessment examining their pedagogical knowledge of informational text comprehension strategies (see Appendix A). Specifically, the assessment was designed to examine teacher knowledge of informational text rhetorical structure and science textbook technical and non-technical vocabulary. A secondary purpose of the assessment was to discover the teachers' knowledge of instructional strategies that: (a) facilitate students recognizing and utilizing science textbook rhetorical structure, (b) facilitate students' learning and applying science technical and non-technical vocabulary, and (c) facilitate students in graphically organizing concepts and vocabulary in an informational text passage to summarize the content.

The post-study assessment (see Appendix A) was administered after the final workshop. The purpose of the post-assessment was to: (a) determine if anticipated changes in the teacher-participants' pedagogical knowledge of informational text rhetorical structure and informational text technical and non-technical vocabulary had changed, and (b) measure anticipated changes in the teacher-participants' understanding of instructional strategies that facilitate students' informational text reading comprehension. I utilized a rubric (see Appendix B) to score the results of both assessments. The categories for the descriptive statistics include: (a) the average score for each test, with pre-post-test averages compared for each teacher and across the three teachers, and (b) the pre-and post-test averages compared to the each overall average of the test scores. Two doctoral students and I independently scored the pre-and post assessments. We discussed and compared our scores and a consensus was reached resulting in an inner-rater agreement of 100%. The small number of teachers (n=3) who participated in the study, limited statistical analysis of the pre- and post- assessments.

I compared the results of the assessment analysis and themes generated in the qualitative inquiry to determine if data from the two types of sources complement and support each other (see Table 3.1 for a summary of the data collection).

Table 3.1

Summary of Data Collection

Timeline	Qualitative Data	Quantitative Data	Workshops	Duration
1st week of study beginning September 8th, 08	Classroom Observation/Baseline	Teacher Pre-Assessment		All teachers – minimum 3 lessons
2nd week of study beginning September 15th, 08	Classroom Observation/Baseline Teacher and principal Interviews			All teachers – minimum 3 lessons 30 min. each
3rd week of study beginning September 22nd, 08			1st Workshop September 23, 2008	2 ½ hours
4th week of study beginning September 29^{th,} 08	Observation of Instruction			3rd Grade
5th week of study beginning October 6th, 08	Observation of Instruction			3rd, 4th, 5th grades
6th week of study beginning October 13th, 08	Observation of Instruction			4th and 5th grades
7th week of study beginning October 20th, 08	Observation of Instruction			4th and 5th grades
8th week of study beginning October 27th, 08			2nd Workshop October 28, 08	2 hours
9th week of study beginning November 3rd, 08	Observation of Instruction Teacher Interview #2			5th grade 3rd and 5th grades 30 minutes
10th week of study beginning November 10th, 08	Observation of Instruction 2nd Teacher Interview			3rd and 5$^{th\ grades}$ 4$^{th\ -}$ 30 minutes
11th week of study beginning November 17th, 08	Observation of Instruction			4th and 5th grades
12th week of study beginning December 1st, 08			3rd Workshop December 2, 08	2 hours
13th week of study beginning December 8th,08	Observation of Instruction			3rd, 4th, 5th grades
14th week of study beginning January 5th, 09	Observation of Instruction			3rd, 4th, 5th grades
15th week of study beginning January 12th, 09	Observation of Instruction			3rd and 4th grades
16th week of study beginning January 19th, 09	Observation of Instruction			3rd grade
17h week of study beginning January 26th, 09	Final Interview			3rd grade
18th week of study beginning February 2nd, 09	Final Interview	Teacher Post-Assessment	Concluding Workshop February 5th, 09	30 minutes Interview: 30 min.

Procedures

Introduction of Study

Initial Researcher-Participant Meeting. Prior to the onset of the study, I met with the participating teachers to explain the objectives and procedures of the research study. I informed the teachers about the instructional strategies being offered as part of this study which would complement their newly acquired repertoire of reading strategies. I explained the teacher-consent forms and informed teachers that, if they consented, I would visit their classrooms during the subsequent two weeks to observe science lessons. The purpose of these visits was to document instructional strategies currently being used so that workshop instruction would not duplicate strategies the teachers were currently utilizing. At the conclusion of the meeting, the participating teachers provided their science instruction schedules so I could establish baseline and subsequent observation schedules.

Professional Development Workshops.

The professional development workshops, which focused on instructional strategies that facilitate student science textbook comprehension, were central to this study. The workshop theoretical framework follows.

Content of Professional Development Workshops. The order of the content presented in the workshops closely aligned with the planning suggested by (Guskey 2003a). An essential step was a collaborative effort in establishing the desired student learning goals to be achieved. Staff development is most powerful when it focuses on results that can be expressed in terms of student achievement (Guskey 2003a; Rude & Brewer, 2003).

To achieve the student learning goals, I provided the teachers with explicit instructional practices, knowledge and skills that facilitate science textbook reading comprehension. It was essential that the teachers had a sophisticated understanding of content, how children learn, and the expectations for them to teach to new standards by implementing newly learned strategies in their classrooms (Birman, Desimone, Porter, & Garet, 2000). The workshops included not only theory but practical application of theory by providing instructional practices that guide students through the reading processes and teach them skills to recognize text structure, read and comprehend their science textbooks.

The content provided specific instruction in four instructional strategies which are the focus of this study: (a) identifying the text's rhetorical structure (compare/contrast, main idea/details, cause/effect, problem/solution, time order), (b) teaching non-technical vocabulary terms that signal rhetorical structure, (c) teaching science (technical) vocabulary terms essential for text comprehension through multiple exposures and deep processing, and (d) supporting comprehension by graphically organizing the concepts presented in the text in a way that aligns with the text structure of the target passage and facilitates summarization. The content also provided a process that facilitated teacher-reflection on lessons taught that utilized the targeted instructional strategies.

Active learning. Teachers who have opportunities for active learning during professional development report increased knowledge and skills and changes in classroom practices (Birman, Desimone, Porter, & Garet, 2000). Active learning includes opportunities to observe and be observed teaching such as practicing in simulated conditions, guided practice in planning classroom implementations and active participation in group discourse (Birman, Desimone, Porter, & Garet, 2000). The professional workshops in this study provided opportunities for the participants to be active learners by allotting time for them to practice new instructional strategies with peers during workshop activities and exercises.

Elements of literacy coaching. Even though I was not a faculty member, the structure of my professional development workshops aligned with several of L'Allier, Elish-Piper and Bean's (2010) seven guiding principles for instructional achievement and student achievement through literacy coaching. Due to my doctoral course of studies, I gained specialized knowledge about informational text reading. This knowledge was the foundation for my workshop presentations. I taught research-based instructional strategies and modeled strategy implementation for the participants (principle one). The teachers were taught a core set of activities that facilitate science textbook reading and were asked to implement them in their classrooms (principle four). A significant portion of my data collection came from observing the teachers after they had learned instructional strategies (principle two). My classroom observations were confidential and I endeavored to establish the teachers' trust (principle three). The workshop instruction was intentional but the follow-up was flexible, depending upon individual teacher's questions and concerns (principle five).

Workshop Description. I conducted four professional development workshops for the duration of 2 to 3 hours during the 3rd, 8th, and 12th weeks of the study. The purpose of the 4th workshop provided the teachers and me the opportunity to summarize the preceding workshops and subsequent application of instructional practices in the classroom. The elementary principal had school-improvement funds she allocated to pay substitute teachers to provide release time for the teachers. The format for the following workshop descriptions is: (a) identification of the workshop, time, place, and participants, (b) description of the purpose(s) of the workshop, (c) description of workshop instruction and related activities, and (d) concluding remarks and instruction. I was the workshop facilitator.

First Workshop. The introductory workshop was held at the elementary school during the third week of the study. The three participating teachers, the elementary school principal, and a process observer, (a doctoral student) were present. During the workshop introduction, I shared the frustrations I had experienced in the elementary classroom when students struggled to read and comprehend their science texts. I explained these experiences were the impetus for my academic endeavor to learn research-based strategies that facilitate young students' content area reading and comprehension and thus, the purpose of the professional development workshops was to instruct the participating teachers on the effective implementation of those specific instructional strategies.

Next, I presented results of research studies to document a rationale for instructing elementary students with strategies to read informational text. The rationale included: (a) background knowledge on the scarcity of informational text and informational text comprehension instruction in classrooms (Duke, 2000), (b) the high percent of academic informational text reading demands on students in grades 6 and higher (Moss and Newton, 2002), (c) information supporting the need for instruction in informational reading comprehension; e.g., the high percentage of informational text questions on the NAEP, content-area books being introduced into the curriculum around third grade with the text being the core curriculum (Harniss, Dickson, Kinder & Hollenbeck, 2001), the fourth-grade slump (Chall, Jacobs, & Baldwin,1990), the cognitive load of informational text in grades 3 through 12 (Moss & Newton, 2002), and (d) a rationale for utilization of informational text as a life-long skill needed in work and community. I suggested that a plausible underpinning problem for young students' difficulties in reading and comprehending informational text is they have encountered minimal instruction in recognizing the rhetorical structure of informational text and are unlikely to have been taught strategies to understand their content-area texts (Duke, 2000). I reviewed the concept of *schema* and provided examples. I emphasized the need for children to develop informational text schemata, and this can be accomplished through repetitive and consistent instruction in the rhetorical structure of informational text.

The third workshop section focused on the rhetorical structures of informational text. I elicited responses from the participants to identify the differences between narrative and informational text. After a brief discussion, I presented specific differences between narrative and information text: (a) rhetorical structure, (b) concept density, and

(c) technical and non-technical vocabulary. I described the characteristics of five common rhetorical structures: (a) main idea/detail, (b) cause and effect, (c) time-order, (d) simple listing, and (e) problem/solution. I provided the teachers time to peruse their respective science text books to find and share examples of the five types of rhetorical structures. The teachers were able to locate only compare/contrast rhetorical structure in their textbooks, so I provided examples of cause/effect and time-order that I had found in the fourth grade science textbook. (The teachers had learned to identify compare/contrast in narrative text in previous workshops.)

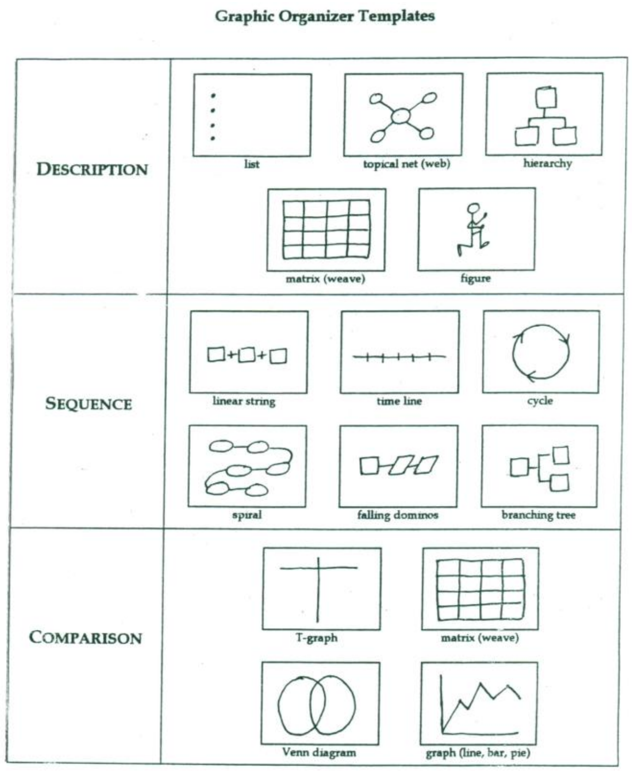
The fourth section of the workshop focused on learning non-technical terms that signal the relationships of the specific informational text rhetorical structures. At this point, I provided the participants with a packet of handouts. The first page in the packet listed five types of informational rhetorical structures including some I had not presented, e.g., description, sequence. The rhetorical structure is described in one column and the non-technical terms that signal that specific relationships were listed in the opposing column (see Table 3.2). The remaining pages in the packet contain samples of graphic organizers for the various rhetorical structures (see Figure 3.1). The participants were provided time to peruse their science texts to find examples of non-technical terms that signal specific relationships in a rhetorical structure. Afterwards, they shared the non-technical terms they found and the relationship the terms signaled.

Table 3.2

Five Basic Text Organizational Structures and Their Signals

Text structure	Signal words and phrases
Description Describes the attributes, specifics, and/or setting. The main ideas is the "who, what, where, when and how."	For example, for instance, this particular, specifically, such as, attributes of, properties of, characteristics of, qualities of, in describing
Sequence Groups ideas by order or time. The main idea is the procedure or sequence of events related.	First,, next, them, afterward, later, last, finally, following, to begin with, to start with, as time passed, continuing on, in the end, years ago, in the first place, before, after, soon, recently
Causation Presents causes or cause-and-effect relationships between ideas. The main idea is organized into cause-and-effect parts.	If/then, as a result, because, since, for the purpose of, caused, led to, consequences, thus, in order to, this is why, the reason, so in explanation, therefore
Problem/solution Portrays a problem and solutions. The main idea is organized into two parts: a problem part and a solution pat, or question pat and an answer part.	*Problem*: problem, question, puzzle, enigma, riddle, hazard, issue, query, need to prevent the trouble. *Solution:* solution, answer, response, reply, rejoinder, return, to satisfy the problem, to take care of the problem, to solve the problem, to set the issue at rest.
Comparison Ideas on the basis of differences and similarities. The main idea is organized into parts that provide a comparison, contrast, or alternative perspectives on a topic	*Compare:* alike, have in common, share, resemble, the same as, is similar to, looks like, is like *Contrast:* in contrast, but, not everyone, all but, instead, however, in comparison, on the other hand, whereas, in opposition to, unlike, differ, different, difference, differentiate, compared to, whereas, although, despite
Listing Occurs with any of the above structures (i.e., when description, sequences, causation, problems/solutions, or comparisons views are presented	And, in addition, also, include, moreover, besides, first, second, third, subsequent, furthermore, at the same time, another

(Klingner, J. K., Vaughn, S. & Boardman, A., 2007)



K. Wilson, (Personal communication, January 8, 2008)

Figure 3.1. Graphic Organizer Templates

During the fifth section of the workshop, I presented specific instructional strategies for displaying key concepts in graphic organizers that align with the informational text structure. I provided a sample lesson, chapter 8, lesson 1 of the fourth grade text, (Hackett, Moyer, Vasquez, Teferi, Zike & LeRoy, 2008), demonstrating the steps to teach an entire science lesson over a period of one to three days (see Appendix C). My demonstration emphasized the “day 2-3” portion of the lesson. I did not include “day 1” of the lesson plan which included a science demonstration and student journal writing to predict the content of the chapter. Even though these activities are essential components of a lesson plan, I wanted to concentrate on the strategies I emphasized during my workshop instruction: technical and non-technical vocabulary, the rhetorical structure and graphic organizer construction. During the model lesson, I taught a mini-lesson on cause/effect by providing multiple examples with questioning, e.g., “Mom drove me to school, because it is snowing. What caused Mom to drive me to school?” The mini-lesson also emphasized the non-technical vocabulary that signaled cause and effect, e.g., because, as a result. I concluded the mini-lesson by soliciting participant examples for cause and effect utilizing the appropriate non-technical terms.

Next, I connected the text structure to the actual reading. “Today we are going to read part of lesson one which tells us about two ways the Earth moves - rotation and revolution. I want you to read carefully to find out what rotation and revolution cause.” During the remainder of the lesson, the teachers read part of lesson one silently and responded to questions afterwards. The participants then completed part of a matrix that depicted the cause and effect relationships they had read in the text (see Table 3.3). The matrix included the non-technical terms taught in the mini-lesson. I suggested for the lesson summary, the teachers describe cause and effect and give an example of cause and effect they just read about in their texts. The purpose of the lesson summary was twofold: (a) I was able to evaluate the teachers’ understanding of cause/effect to determine if clarification was needed, and (b) by actively participating in a lesson summary, teachers had the opportunity experience the effectiveness of this strategy and might consider implementing lesson summaries in their classroom.

Table 3.3

Cause and Effect Matrix

Earth's Movement	What is it?	How often?	How it causes day?	How it causes night?	How it causes shadows?	Early Morning Shadows	Afternoon Shadows
Rotation	Earth rotates or spins on its axis (an imaginary line on which an object spins)	Rotates once (one complete rotation) every 24 hours	It is day when where you live faces the sun.	It is night when were you live faces away from the sun.	When an object blocks the sun's light.	Your shadow is long. It shrinks until noon.	Your shadow gets longer after noon and grows longer until sunset.
Earth's Movement	What is it?	How often?	How does the Earth's axis tilt?	What does the tilt cause the sunlight to do?	How does this affect the amount of sunlight each hemisphere receives?	How does the Earth's tilt cause summer in North America?	How does the Earth's tilt cause winter in North America?
Revolution	When Earth travels around the sun	Once every 365 ¼ days or one year	At an angle; not straight up and down	Strike the Earth at different angles.	Each hemisphere or half of the Earth gets more or less sunlight.	The north pole points towards the sun and gets lighter.	The north pole points away from the sun and gets less light.

At the conclusion of the workshop, the participants and I collectively established specific goals for their students' science textbook reading comprehension as a result of new strategy implementation.

Post workshop instructions. I asked the participants to pre-read their science lesson for the subsequent week of instruction and to determine the rhetorical structure of the lesson. Specifically, I asked for the teacher to: (1) incorporate a rhetorical structure mini-lesson at the beginning of the lesson, (2) teach the non-technical terms that signal this particular rhetorical structure, and (3) graphically display the lesson's key concepts and technical and non-technical vocabulary terms in a graphic organizer. I suggested the graphic organizer be constructed by the class under the guidance of the teacher and that whole-class construction continue until the teacher determined when the students were ready to construct an organizer independently. I provided the teachers with a copy of the sample lesson plan as a model to facilitate their science lesson plan development (see Appendix C).

I informed the teachers I would like to visit their classrooms while they were teaching a science textbook reading lesson and did not anticipate visiting any classrooms until the following week to provide them time to plan their science lessons. I asked the teachers to contact me when they were ready for me to observe. I gave the participants a lesson-reflection form and requested they complete a reflection after each science textbook reading lesson. I explained the questions on the reflection form and indicated I would also send them an electronic copy. I expressed a willingness to stay after the workshop to help any teacher who was interested in working on her science lesson for the following week. I also indicated I would be available to field questions via email or in person, anytime I was in the building. After participating in a workshop for 2 ½ hours, all three participants elected to go home (see Table 3.4 for a summary of first workshop content).

Table 3.2

Summary of Content of First Professional Development Workshop

First Section	Second Section	Third Section	Fourth Section	Fifth Section	Conclusion
Introduction – explanation for the impetus for the study	Research results that support teaching young children strategies to read informational text:	Differences between narrative and informational text	Non-technical terms that signal specific rhetorical structures	Specific instructional strategies to teach rhetorical structure utilizing GOs	Teachers established specific goals for students' science textbook reading
	(1) scarcity of informational text (Duke, 2000)	(1) rhetorical structure		Focused on cause/effect	Post-workshop instructions – teachers were asked to: (1) lesson reflection after each lesson
	(2) high academic demands of informational text reading success in grades 6 and higher (Moss & Newton, 2002)	(2) concept density		Handout of a sample lesson plan	(2) incorporate a rhetorical structure mini-lesson before each science lesson
	(3) Research results that support student-need for achievement in reading informational text (Chall, Jacobs, & Baldwin,1990; Harniss, Dickson, Kinder & Hollenbeck, 2001; Moss & Newton, 2002)	(3) technical and non-technical vocabulary			(3) teach non-technical terms that signal rhetorical structure of science text
	(4) rationale for utilization of informational text as a life-long skill	Identification of common rhetorical structures			(4) graphically, non-technical vocabulary in a graphic display important terms, concepts organizer

Second Workshop. The second professional development workshop was held during the 8th week of the study. The three participating teachers, the elementary school principal, the process observer and I were present. I opened the workshop by reviewing the three instructional strategies the participants had been asked to implement for science textbook reading lessons in the past four weeks. The strategies were teaching text structure, technical and non-technical vocabulary, and utilizing graphic organizers to visually display each lesson's key concepts and vocabulary. I asked the participants to identify the successful instructional strategies and to explain why they believed those strategies were successful, i.e., "How did you measure strategy success?" The teachers were also encouraged to identify the difficulties they were having implementing these specific strategies. I probed the teachers to share any discoveries they had made during strategy implementation and also asked them to share their perceptions of their students' science textbook reading achievement since new strategy implementation.

During the four weeks of observation after the first workshop, I had been invited to observe science lessons that involved multiple ways of delivering science content other than reading the textbook. I acknowledged that all modes of delivering science content is important, but emphasized the purpose of this study and workshop series was to focus on the instructional strategies that facilitate student reading and comprehension of the science textbook.

The content of the second workshop included modeling instructional strategies that facilitated the comprehension of informational text with a compare/contrast text structure. I also presented strategies that facilitate deep processing of vocabulary. The third and final topic of the workshop focused on research-based evidence that suggests graphic organizers are most beneficial when constructed after the text has been read and when the teacher gradually releases control of this task to the students.

I had developed a short informational article on a topic of possible interest to the teachers – gemstones. I obtained the information in the article from an on-line encyclopedia and the completed article had a Flesch-Kincaid readability level of 11.9. I began the model lesson by pre-teaching three vocabulary terms utilizing a vocabulary strategy, *Possible Sentences* (Stahl & Kapinus, 1991). I asked the teachers to create "possible" sentences with each of the three vocabulary terms: mineral, synthetic and hue. I wrote the "possible" sentences on the white erase board. I indicated that after the text had been read and the focus vocabulary words read in context, the teachers would return to the sentences to make any corrections or adjustments. The next step in the modeled lesson was a mini-lesson on the rhetorical structure, compare/contrast. I provided examples of compare/contrast, emphasizing the non-technical terms that signaled this relationship. I encouraged the participants to provide their own examples of compare/contrast. I wrote the non-technical terms on the white erase board for reference during the remainder of the lesson. I instructed the participants to skim the article and highlight any non-technical words that signaled compare/contrast to facilitate their recognition of the compare/contrast rhetorical structure within the article. The participants then silently read the article, *Gemstones*.

After all participants finished reading the article, they helped me complete a matrix drawn on the white erase board (see Figure 3.2). The matrix compared and contrasted three gemstones according to their hardness, mineral from which they are formed (source), hue, natural occurrences and practical uses. During this demonstration, I emphasized that providing children with specific categories, the process of comparing and contrasting is facilitated; whereas giving general directions to simply contrast unlike things does not guide the children to specifically compare/contrast characteristics in the same categories. I provided the teachers with a three-way Venn diagram as an example of another compare/contrast format. After a short discussion, the teachers decided the matrix was a stronger graphic organizer. It specifically categorized the characteristics to be compared and contrasted while the Venn diagram had few guidelines.

Type	Mineral Composition	Hardness	Color	Natural Occurrences	Natural Uses
Sapphire					
Ruby					
Emerald					
Diamond					

*Figure 3.2.*Gemstones

I returned to the *Possible Sentences* written on the white erase board. With guidance, the teachers discussed the meanings of the three terms as they were used in context in the article and decided that their possible sentences did not need correction. I provided a handout which contained the three vocabulary words and an illustration of another vocabulary strategy -- vocabulary concept cards (Moje, 1996). I gave each participant 3 small index cards. I instructed them to write the vocabulary term on one side of the card, turn the card over and draw lines to divide the card into four equal parts.

Then, I asked them to write a definition of the vocabulary term in one section of the card, use the word in a sentence in another section, write a synonym for the vocabulary term in the third section and finally illustrate the term or write what the term is not in the fourth section. The concept cards are a vocabulary strategy that can be utilized post-reading. The cards can be kept by the students and taken out for a quick review with a partner during their free time.

During the model lesson, I introduced the vocabulary terms with the strategy, *Possible Sentences.* I incorporated the vocabulary terms in the graphic organizer and I reviewed the terms at the end of the lesson with the creation of the concept cards. I emphasized multiple and varied exposures to vocabulary terms facilitates deep processing.

I utilized the article, *Gemstones*, to model "inconsiderate" text or text that does not have clear relationships across sentences and paragraphs (Alvermann & Boothby, 1983). In this process, I asked the participants to find the sections of text that contained irrelevant information or information that did not contribute to the main ideas in the article as displayed in the graphic organizer. I emphasized that teachers must instruct their students in the same manner, helping them to sift through information and decide which is relevant or irrelevant. The model lesson ended with a "closed book" quiz about gemstones. After the teachers completed the quiz, we discussed their answers. I asked the teachers to explain why they were able to recall all the material presented on the quiz. In summary, I reviewed the instructional strategies for teaching rhetorical structure, non-technical vocabulary terms, deep-processing of vocabulary, and graphic organizers that align with the rhetorical structure to display the content and vocabulary. I reiterated that research indicates graphic organizer construction after the text reading results in greater recall of the text. Graphic organizer construction is most effective when scaffolded by the teacher before the ultimate goal of independent student organizer construction can be reached; this process could take months to complete.

At the conclusion of the second workshop, I requested the participants continue teaching rhetorical structure and non-technical vocabulary terms with their science textbook reading lessons and to also implement the vocabulary strategies presented in the workshop, focusing on multiple and varied exposures to the vocabulary terms found in each lesson. I stressed that vocabulary instruction went beyond writing the terms, finding their definitions in the glossary and then copying the definitions onto paper. I specifically requested the teachers implement the graphic organizer *after* the textbook reading. During previous observations, I had been invited to visit in the middle of a science textbook lesson. Therefore, I indicated I would like to observe all the days of instruction of a particular lesson so I could observe the process and sequence of strategy implementation. The teachers would need time to plan their lessons with new strategies, so I did not plan on visiting until the succeeding week. I requested the teachers notify me when they were ready for me to observe.

During observations after the first workshop, I implemented an audio-taped teacher-reflection interview for some of the lesson reflections because I had had impromptu conversations with the teachers about their instructional practices and I wasn't prepared to record the conversations. The interview format provided me with the opportunity to continue those conversations and to probe deeper to ascertain teacher beliefs and attitudes. As a result, for the subsequent lesson reflections, I gave the participants the choice of written a lesson reflection or giving a lesson reflection interview. I dismissed the workshop after being in session for two hours (see Table 3.5 for a summary of workshop content).

Table 3.3

Summary of the Content of Second Professional Development Workshop

First Section	Second Section	Third Section	Conclusion
Review of three instructional strategies	Lesson on compare/contrast using *Gemstones*	Utilized *Gemstones* to model "inconsiderate" text (Alvermann & Boothby, 1983)	Post-workshop instructions: (1) lesson reflection after each lesson
Discussion on success of strategy implementation	Compare/contrast non-technical terms introduced	Quiz over content in *Gemstones* with follow-up discussion of results	(2) continue teaching rhetorical structure & non-technical vocabulary with science textbook reading lessons
Reminder: focus of workshop is facilitation of student comprehension of science textbook	Technical vocabulary strategies: *Possible Sentences* & vocabulary concept cards with emphasis on deep-processing	Presented research that supports effectiveness of graphic organizer construction after textbook reading	(3) implement *Possible Sentences* & vocabulary concept card – deep processing vs. copying definitions
Introduction of article, *Gemstones*	Concepts in *Gemstones* compared and contrasted using matrix as compared to Venn diagram		(4) graphic organizer construction after textbook reading

Third Workshop. I held the third professional development workshop during the 12th week of the study. Two teachers, the elementary school principal, and I participated. The fifth grade teacher was ill that day. Because the process observer was unable to attend, the workshop was audio-taped and transcribed. Since the previous workshop, I had observed the three teachers implementing the vocabulary strategy, *Possible Sentences* with varying degrees of success; some teachers were not implementing the strategy correctly. To facilitate understanding of this vocabulary strategy, I gave the participants copies of the article, *Possible Sentences: Predicting Word Meanings to Teach Content Area Vocabulary* (Stahl & Kapinus, 1991). Afterwards, through direct instruction, I clarified misconceptions of the principles and procedures of this strategy and encouraged the teachers to ask questions.

To promote further discussion, I asked the teachers to identify successful rhetorical structure, vocabulary development and graphic organizer instructional strategies they had implemented and to explain why they believed these strategies were successful. I also encouraged the teachers to identify the difficulties they were having in the implementation of any of these specific strategies. A lengthy discussion ensued, focusing on strategy implementation and concerns about the strengths and weaknesses of their science reading lessons.

Before the introduction of the first activity, I asked the teachers to identify the purposes of reading informational text; the participants' consensus was the purpose is to learn and retain information. The discussion established the purpose of the first activity - to demonstrate that older, mature readers have a repertoire of reading strategies they utilize to read and recall what they have read. I provided the participants with an article titled, *Characteristics of Viruses Parts I and II* (Straus & Lisowski, 1998) which had a Flesch-Kincaid readability level 10.6 and directed them to read the article silently with the purpose to learn and remember. I provided markers for highlighting portions of the article and I provided paper for note-taking if the participants selected one of the those strategies to facilitate recall. The participants read the article silently, utilizing self-selected strategies to aide recall of the content. After the participants read the article, we summarized the content of the article aloud. I asked the participants to share the strategies they utilized to help them retain and recall the information in the text. I explained that young readers need to be taught specific strategies to help them comprehend and recall. Educators cannot assume that students have a repertoire of reading strategies.

I reiterated the workshop series was a progression; instructional strategies introduced in beginning workshops were built upon the strategies succeeding workshops. To date, the participants had been asked to teach rhetorical structure and non-technical vocabulary and to utilize graphic organizers to display the content of science text read. The final strategy and main focus of the third workshop was utilizing graphic organizers to summarize the science text.

Using a PowerPoint presentation, I presented research data that supports the effects of reading comprehension improvement and recall of information when students summarize passages (Mastropieri, Scruggs & Graetz, 2003; Rinehart, Stahl, & Erickson, 1986; Taylor & Beach, 1984). I included research data that supports the effectiveness of graphic organizers on students' abilities to summarize; i.e., Dicecco and Gleason's (2002) study where graphic organizers aided students in recalling relational knowledge and aided their ability to discern the relevant facts from the irrelevant information. Graphic organizers can provide students with sufficient prompts to arrange the information to be learned into a logical organization that contributes to subsequent recall. I presented instruction in summarizing text by using graphic organizers in the following steps.

The process of summarization using the ordered content in a graphic organizer involves several steps, beginning with identifying the rhetorical structure of the text. The participants readily identified compare/contrast as the rhetorical structure of *Characteristics of Viruses Parts I and II* as indicated by the article subheading: *Similarities and Differences between Viruses and Cells* (Straus & Lisowski, 1998). After I encouraged the participants to examine the second part of the article more closely, they decided the rhetorical structure for this section was sequencing. The participants continued until they had identified four sections in the article, each written in a specific rhetorical structure.

The purpose of preceding exercise was to facilitate the participants' awareness that a science text passage is often written with more than one rhetorical structure. I provided the participant with four different graphic organizers, each one designed to align with a specific text structure within the article (see Table 3.6 and Figure 3.4). Due to time constraints, I completed the graphic organizers beforehand. The participants validated the content and structure of the organizers by cross-referencing the article passages and their rhetorical structures with the main ideas presented in each specific organizer. Before continuing to the next step, I reiterated the purposes of constructing graphic organizers: (a) important concepts are recorded in spaces whose pattern aligns with the rhetorical structure of the text, (b) non-technical terms in the organizer signal the structure, (c) important vocabulary terms are used in context within the organizer, (d) graphic organizers aid young readers in sifting through the information to sort the relevant from the irrelevant, and (d) graphic organizer construction promotes a read-write connection.

	Definitions/ Characteristics	Size	Parts	Existence	Genes	Heredity	Preproduction/ Replication
Virus	An infectious agent made up of a core of nucleic acid and a protein coat. NOT CELLS- Have organized structural parts.	Compared to cells, very, very tiny	Two parts: 1. protective protein coat called capsid; may consist of several kinds of protein; protects the viral nucleic acid core 2. core of nucleic acid Also contains RNA, the heredity material	Viruses do not eat, respire or respond to environmental changes as cells do	5 genes	Contains RNA which is the hereditary material	Do not reproduce; replicate; cells do not divide; require a host to replicate (hosts provides all the materials viruses need to copy themselves
Cells	Plant and animal cells	Compared to cells, very, very tiny	Cells have a nucleus, a membrane or cellular organelles such as ribosome, mitochondria or chloroplasts.	Eat, respire and respond to environmental changes	Human cell has 100,000 genes; bacterial cell 1000 genes	Contains DNA which is the heredity material	Cells Divide

Figure 3.5. Similarities and Differences between Viruses and Cells

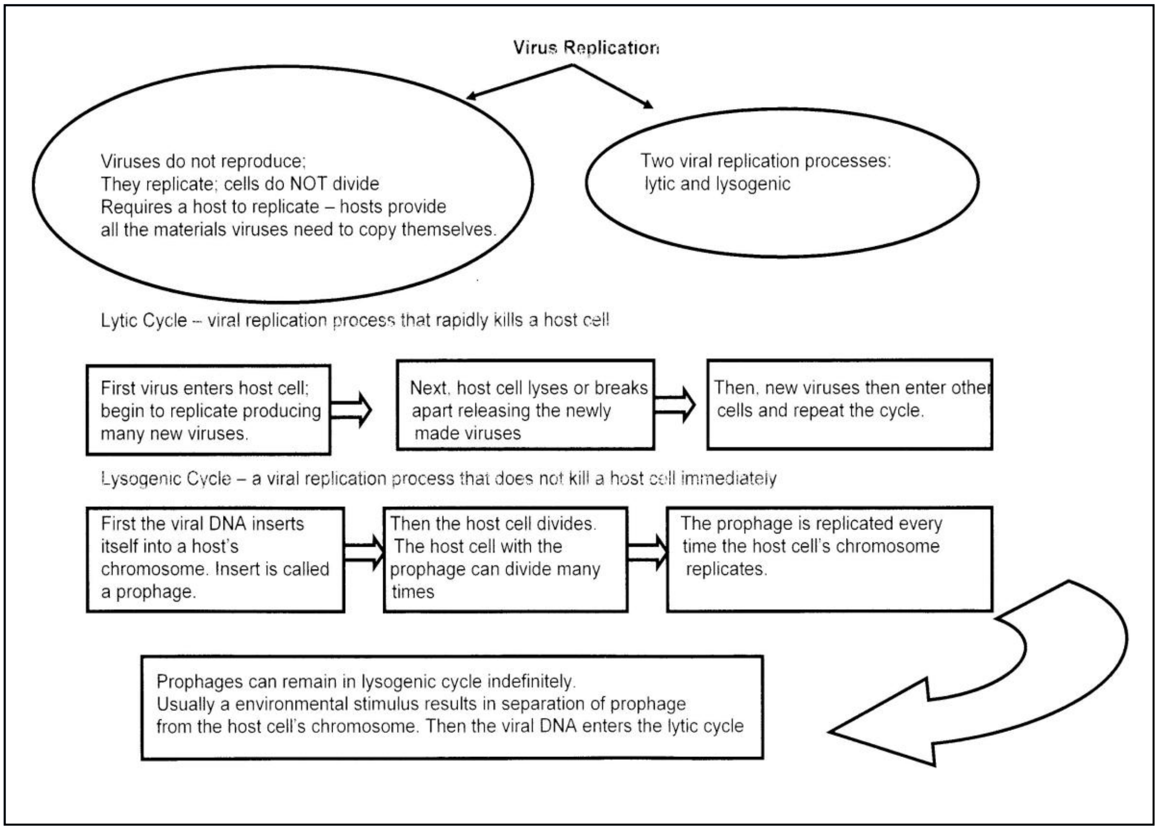


Figure 3.4. Virus Replication

I directed the participants to look at the matrix that compared viruses and cells and followed with instructional steps to write a summary that compares viruses and cells. First, I asked the teachers to use the organizer to develop a topic sentence, i.e., *Viruses are Alike and Different.* Next, we composed sentences in which specific attributes (i.e., characteristics, size, parts, existence, genes and heredity) of viruses and cells were compared and contrasted. After we completed summarizing the compare/contrast section of the article, I directed the participants' attention the graphic organizer that contained a description of virus replication. I suggested a second summary paragraph could be written utilizing that particular graphic organizer. The structure would be main idea/detail, not compare and contrast like the first paragraph. The participants examined the remaining organizers and collectively described how to write the last two summary paragraphs for each of the two article sections written with a sequence rhetorical structure. I emphasized the utilization of graphic organizers, in the classroom, to write summaries of science text would require a great deal of teacher scaffolding and student practice.

The participants expressed concern in finding the time during science lessons to teach summarizing. I suggested summarization could be a language arts lesson taught during the language arts block and then connected to science at the conclusion of a science lesson.

I concluded the workshop session with the request subsequent science lessons include a culmination of the strategies introduced in the three workshops including the newest strategy of summary writing using the graphic organizers. I provided the participants with a written description of the instructional strategies (see Appendix D). I asked the teachers to notify me when they were ready for me to observe a complete science textbook lesson (see Table 3.7 for summary workshop content).

Table 3.7

Summary of Content of Third Professional Development Workshop

Section	Component	Component	Component
First Section	Clarification and further instruction for *Possible Sentences*	Participants discuss successful rhetorical structure, vocabulary development and graphic organizer strategies they have implemented	Clarification of purposes for reading informational text
Second Section	Teachers read informational article and utilized self-selected strategies to recall content	Discuss self-selected strategies emphasizing young readers do not have a repertoire of strategies	
Third Section	Workshop a progression of instructional strategies; last strategy was utilizing graphic organizers to summarize text	Research results indicate students improve comprehension and recall when text is summarized (Taylor & Beach, 1984; Rinehart, Stahl, & Erickson, 1986; Mastropieri, Scruggs & Graetz, 2003)	Research results on effectiveness of utilizing graphic organizers to summarize text (Dicecco & Gleason,2002)
Fourth Section	Examination of informational article resulted in identification of four rhetorical structures	Graphic organizer for each rhetorical structure	Teachers summarized article using graphic organizers
Conclusion	Post-workshop instructions: (1) lesson reflection after each lesson	(2) continue teaching rhetorical structure, non-technical & technical vocabulary strategies with science textbook reading lessons	(3) graphic organizer construction after textbook reading; utilize graphic organizer(s) to summarize science lesson

Fourth Workshop. I conducted the concluding workshop during 18th week of the study. The three participating teachers, the elementary school principal, and I were present. The workshop was audio-taped and transcribed. My main focus for this workshop was to summarize the instructional strategies presented in the preceding workshops and which I had asked the participants to implement in their classrooms. I began the workshop by asking the participants to describe rhetorical structure and to provide examples they had found in their science texts. The teachers responded to questions to review the specific vocabulary strategies, graphic organizer construction strategies, and the summarization strategy, all of which had been presented during the first, second and third workshops.

Next, we returned to the goals the participants had established during the first workshop. The goals had been type-written and I distributed copies among the participants. I directed the participants to comment on the goals, asking them if the goals had been met and if so, to describe how they measured success. Then, I directed the participants to identify and discuss future science textbook reading goals. The discussion concluded with comments from the elementary principal. She stated the next reading goal is to learn and implement vocabulary instructional strategies for both narrative and informational text. The final workshop dismissed after a 30 minute session (see Table 3.8 for a summary of workshop content).

Table 3.8

Summary of Fourth Professional Development Workshop

Section	Component	Component
First	Summarization of instructional strategies presented in preceding workshops	Teachers identified rhetorical structures they had found in their science texts
Second	Review of student-learning goals established during first workshop; discussion if goals had been met and if so, how teachers measured success	Future science reading goals identified
Third	Post-assessment distributed	

Classroom Observations

Baseline Observations. I observed the three teachers during science textbook reading lessons, prior to the first professional development workshop, to establish a baseline of the quantity and quality of reading instructional practices that were in place. The baseline observations took place during the first two weeks of the study prior to the first professional development workshop. During the introductory meeting, the teachers provided me with their science class schedules and they stated I could visit anytime during the subsequent two weeks. I gave each participating teacher notification prior to my first classroom visit. (See Table 3.9 for a summary of the baseline date collection.)

Table 3.9

Summary of Baseline Data Collection

Date	Monday Week 1	Tuesday Week 1	Wednesday Week 1	Thursday Week 1
Grade and Sections	4th A & B 5th B	5th A & B 3rd B	3rd B 4th A & B 5th B	3rd B 5th A
Date	Monday Week 2	Tuesday Week 2	Wednesday Week 2	Thursday Week 2
Grade and Sections	3rd B 4th A 5th A	3rd A 4h A 5th B	3rd A 5th B	3rd B 4th B 5th A

The purpose of the baseline observations was twofold. First, I focused on the quantity and quality of: (a) science textbook rhetorical structure instruction, (b) science textbook vocabulary instruction, (c) instruction in the implementation of graphic organizers to clarify concepts and vocabulary presented in the science textbook instruction, (d) passage summarization, and (e) the placement of instructional strategies in the lesson (pre-reading, during reading and post-reading.) The second purpose of the initial series of observations was to condition the students and teacher to my presence in the room. During baseline observations, I also became interested in recording individual teaching styles (e.g., hands-on, direct instruction), and the configurations for textbook reading.

I conducted baseline observations by unobtrusively entering the classroom and sitting at an unoccupied table. Initially, I utilized a teacher-observation form (see Appendix E). After using this form for eight baseline observations, I decided I needed a larger space to record detailed observations. I began writing the observations with pencil/paper and then transcribing the notes at the end of the day. To expedite the observation recording process, I abandoned the pencil/paper method and began recording all observation on a laptop computer. I recorded subsequent baseline and all post-workshop observations on a laptop computer.

Specifically, I identified and described: (a) occurrences of any of the aforementioned instructional strategies, (b) length of strategy instruction, (c) configurations for science textbook reading (individual, small group, round-robin, teacher reading to the students, etc.), (d) amount of time spent reading the text, (e) teacher encouragement for independent student strategy implementation, and (f) time spent on hands-on learning. Also, teacher dialog during strategy instruction was transcribed on the laptop. I notated questions about the lesson content and for clarification, presented these questions to the teacher directly after the science lesson, if time permitted. If time did not allow for quick dialog, I emailed the questions to the teacher or asked the questions on the lesson reflection. I utilized the baseline observations for workshop planning. For example, I noted during baseline observations, none of the participating teachers taught the rhetorical structure of the science text passages nor incorporated instructional strategies that facilitated deep processing for vocabulary learning. Consequently, I incorporated strategies for rhetorical structure and vocabulary instruction in all three professional development workshops.

The science instruction periods for the three teachers overlapped. Observing both sections of one grade level science for all three grades was not possible on a daily basis. During the first week of baseline observations, my goal was to observe both sections of each grade level to ascertain if content and delivery were similar across both sections. The goal during the second week of baseline observation was to observe consecutive lessons across grade levels, so I could observe lesson instruction in its entirety. The overlapping schedules created a challenge to meet these goals.

Post-workshop observations. Observations of regular classroom science reading lessons took place during the weeks following each professional development workshop, typically beginning one week after each workshop. Each participant determined her schedule for post-professional workshop observations. After each workshop, I provided time for the participants to develop lessons that incorporated the newly introduced instructional strategies. After a science lesson had been developed, each teacher notified me with the dates the lesson was going to be taught so I could observe. If I was not contacted by a teacher within the second week after the professional development workshop, I emailed the teacher with a brief inquiry about a future observation date.

All lesson observations were audio-recorded and transcribed; the recording served as a cross-reference for written observations. When possible, I placed the tape recorder in the front of the room prior to the lesson. I always sat in the back of the classroom at one of the large tables used for small group work. I recorded all notes on a laptop computer. I labeled each observation with the teacher's name, date of observation, classroom section that was being observed (A or B), and the specific science lesson, i.e., chapter and lesson number. I also collected artifacts from each lesson, when there were extras, such as graphic organizers utilized in the lesson. I did not participate in any of the classroom instruction or activities.

I developed a coding system to identify each grade-level classroom. The participating elementary school has two third and two fourth grade classrooms. The two same grade-level classroom teachers share the responsibility of teaching science and social studies for their respective grade level with one teacher instructing science and the other teacher instructing social studies. At a pre-established time each day, Monday through Thursday, the participating teacher sent her students to other grade-level classroom for instruction in social studies and the other grade level class came to her classroom for instruction in science. After a prescribed period of time, (30 minutes for third grade and 35 minutes for fourth grade), the same grade-level students switched classrooms again, returning to their own classroom. The participating teacher then instructed her "own" students in science for a scheduled time period. For observational purposes, I labeled each teacher's own class "A" and labeled the other same-grade level class "B."

The schedule for the fifth and sixth grade classrooms differed. The daily schedule for these two grade levels more closely resembled a typical middle school schedule with the students changing classrooms and subjects every 45 minutes. Consequently, the fifth and sixth grade teachers did not have their "own" students; the four teachers shared all teaching responsibilities. The participating fifth grade teacher taught two sections of fifth grade science with the first taking place 11:25 a.m. – 12:15 p.m. (labeled "A" for this study) and the second one taking place1:45 p.m. – 2:35 p.m. (labeled "B" for this study.) The schedule for science instruction for the participating teachers is in the Table 3.10.

Table 3.10

Science Instruction Schedule for Third, Fourth and Fifth Grades

Grade	Section	Time
3	B	2:00 p.m. - 2:30 p.m.
3	A	2:30 p.m. - 3:00 p.m.
4	B	12:15 p.m. - 12:50 p.m.
4	A	12:55 p.m. - 1:35 p.m.
5	A	11:25 p.m. - 12:15 p.m.
5	B	1:45 p.m. - 2:30 p.m.

The lesson observation schedule was not sequentially consistent across science lessons for all the three participants. For example, in third grade, I did not observe lessons two and three in Chapter 3. I was unable to observe on some occasions for various reasons such as a visit from "Smokey the Bear," a Veteran's Day program, science fair preparation, a death in a participant's family, participant absence due to illness or out-of-town workshop attendance or the participants did not invite researcher to observe all science lessons. The fourth grade teacher had a student teacher in the classroom during the research study who would eventually assume all teaching responsibilities. To accommodate me, the fourth grade teacher agreed to provide science instruction for her own students; therefore, I observed only section A in the fourth grade. The number of observations for each teacher was determined by two factors: (a) the number of times the participant invited me to observe, and (b) the number of science reading lessons taught by each participant. (The number of science reading lessons was reduced in classrooms that had more hands-on activities.) Since the three participating classrooms had overlapping schedules, the selection of class sections for observation was influenced by scheduling factors.

The first series of observations took place during the 4th, 5th, 6th and 7th weeks of the study immediately following the first professional development workshop. The instructional strategies introduced in this workshop focused specifically on teaching: (a) rhetorical structure of each specific science lesson, (b) non-technical vocabulary that signaled the rhetorical structure, and (c) construction of graphic organizers which aligned with the text's rhetorical structure to display key concepts and vocabulary found in the content. During science reading lesson observations, I focused on these three strategies by notating the identification and description of strategies implemented and the length of the actual strategy instructional period. Specifically, I noted the methods of instruction such as use of charts, diagrams other visual devices, provision of oral and/or visual examples, encouragement of student strategy discussion through questioning, review of previously introduced strategies, scaffolding of strategy implementation, and gradual release of control for strategy implementation. I also recorded instructional connections made among the strategies, i.e., making connections between rhetorical structure, non-technical vocabulary and graphic organizers. I also noted the configurations of science textbook reading.

The second series of observations took place the 9th, 10th, and 11th week of the study after the second professional development workshop. The two newly introduced instructional strategies included: (a) facilitating students to deeply process vocabulary, and (b) constructing graphic organizers at the end of a lesson. At the conclusion of the workshop, I asked the participants to continue teaching the strategies introduced in the first workshop, to add the new vocabulary strategies and to construct the graphic organizer at the end of the science reading lesson. The second series of observations aligned with the first in process and content differing only with added observations of participant implementation of the new strategies.

The third series of observations took place during the 13th, 14th, 15th, and 16th week of the study and after the third professional development workshop. The main focus of the third workshop was utilizing completed graphic organizers to summarize content in the science lessons. My observations in the third part of the study focused on participant implementation of all the strategies introduced in all three workshops with the content and process of observation remaining the same across all observations. For the third series of observations, I requested copies of the summaries students wrote with the aid of their graphic organizer.

Lesson Reflections

Written reflection gives teachers the opportunity to examine their instruction and question how they are meeting the needs of their students (Ross, 2002). The purpose of lesson reflections in this study is twofold: (a) it provided the teachers the opportunity to examine their science reading instructional practices through a reflective lens, and (b) it provided me with the teacher's perception of the science reading lesson. I provided the participants with both a hard and electronic copy of the teacher-reflection form immediately following the first professional development workshop (see Appendix F) and I directed them to reflect on a science reading lesson soon after the lesson had been taught. Questions on the reflection form asked the teacher to: (a) name and describe the instructional strategies (text structure, vocabulary or summarization) taught, (b) identify if the teacher utilized a graphic organizer and if so, in which part of the lesson (beginning, middle, conclusion) and who constructed or co-constructed it (teacher and/or student), (c) explain their perceptions of science textbook reading success and how they measured reading achievement, (d) explain how the lesson was summarized and by whom, (e) explain their perceptions of the strengths and weaknesses of the lesson (successful strategy instruction and why or why not), and (f) explain what they will change the next time they teach the lesson and why. The participants notified me when they had completed a hand written lesson reflection and I collected it the next time I was in the building. The participants sent their completed electronic forms to me via email communication.

After I had collected lesson reflections from all three participants following their first science reading lesson, the format for lesson reflections changed. During each classroom observation, it became apparent that to more clearly understand the process and intent of each science reading lesson, it was essential that I include questions specific to the lesson. Subsequent lesson reflections aligned with the original format and contained the same questions but I included additional specific questions.

I also added a lesson-reflection interview option after I had collected the first lesson reflection. While collecting the fifth grade lesson reflection, the teacher and I became engaged in an impromptu conversation about the instructional strategies. I wanted to create the opportunity to audio-record future conversations. One avenue to create this opportunity was to offer the participants a choice between lesson reflection formats: interviews or written lesson reflections. The taped lesson reflection interview provided me with the opportunity to probe the teachers to provide more details when answering questions.

The lesson reflection interviews aligned with the format of the original written lesson reflections but also contained additional questions specific to each particular lesson. The taped lesson reflections also contained impromptu probes to elicit a more detailed response. The audio-taped lesson reflections were transcribed. The number of lesson reflections collected from each participant can be found in Table 3.11. The fourth grade teacher did not participate in two lesson reflections. I was unable to meet her for a reflection interview because of illness and the district's winter holiday which began shortly afterwards. The second missed reflection was due to scheduling conflicts.

Table 3.11

Summary of Lesson Reflections Collected

Teacher	Number of Lessons Taught	Written Reflections	Interview Reflections	No Reflections
3rd	8	5	3	0
4th	6	1	3	2
5th	6	1	5	0

Interviews. The purpose of the initial interview was to discover the content and process of workshops previous to the study that introduced reading strategies, and to learn the teachers' science textbook reading strategies in place. Information from the initial interviews aided me in the design of the first and subsequent workshops to ensure I had introduced the participants to new informational text instructional strategies and to ascertain the workshop presentations aligned with the educational philosophy and beliefs of the principal and three participating teachers.

Principal Interview. Before the first professional development workshop, I conducted a semi-structured interview with the elementary school principal; the interview was audio-taped and transcribed. I prepared interview questions and added necessary probes to elicit more information when needed (see Appendix G). The purposes of the interview were to: (a) discover the content of previous workshops where reading instructional strategies were introduced and to gain an understanding of the principal's perception of teacher implementation of these strategies, (b) discover the principal's perception of the participants' beliefs in strategy implementation success and how they measured this success, (c) learn if the three participating teachers had received previous training in instructional strategies for reading informational text, (d) discover if the participants had been asked to implement newly learned strategies and if the participants did, how both the participants and principal measured strategy success, and (e) discover the principal's perception of third, fourth, and fifth grade teachers' receptiveness to the implementation of new instructional practices. An additional purpose of the interview with the principal was to discover the accommodations made for students who are reading below grade level and/or are classified as ELL (English Language Learners) students.

Teacher interviews. The first teacher interviews took place during the second week of the study before the onset of the professional development workshops. I interviewed each teacher after school in her classroom; the interviews were audio-taped and transcribed. I utilized prepared interview questions and added necessary probes to elicit more information when needed (see Appendix H). The purposes of the initial teacher interview were to: (a) discover the science textbook reading instructional strategies in place and the frequency of implementation, (b) explore the participants' beliefs and attitudes towards strategy implementation and their receptiveness to the introduction of new instructional strategies, (c) learn how the teachers assessed student science textbook reading achievement and how they formulated their understandings of their students' science reading achievement, (d) establish a baseline of the teachers' beliefs and attitudes towards science textbook reading instruction, and (e) establish the teachers' goals and needs in science textbook reading instruction so I could tailor the first professional development workshop to meet the teachers' specific needs and goals.

Subsequent Teacher Interviews. The second interview took place after the second professional development workshop during the 9th and 10th week of the study and the final interview occurred during the 17th and 18th week of the study. The location and format mirrored the first interview (see Appendix H). The purposes of the second and third interviews were to discover the relationship between the workshops and the teachers' beliefs and attitudes towards science textbook reading instruction and to ascertain why they have constructed these beliefs. I was also interested in discovering the teachers' perceptions of the effects of the newly implemented instructional strategies on their students' reading achievement. A secondary purpose of the second and third interviews was to triangulate data within three sources: (a) classroom observations and (b) lesson reflections, (c) teacher interviews.

Qualitative Data Analysis

The qualitative data was transcribed into a computer word processing program and then analyzed by categorical aggregation (Stake, 1995). Utilizing this method, I categorized the properties of the actions according to the following data sources: (a) classroom observations, (b) lesson reflections, and (c) teacher interviews. I then sequenced the actions according to their occurrence in the study: (a) baseline, (b) post-first professional development workshop, (c) post second-workshop, and (d) post third workshop (see Table 3.12).

Table 3.12

Data Analysis Categories

	Data Analysis Categories		
	Classroom Observations	Lesson Reflections	Interviews
Time Blocks			
Baseline	• rhetorical structure • key science vocabulary terms including non-technical vocabulary terms • graphic organizers to clarify concepts in science lessons • student summary writing of a lesson • time during lesson for strategy implementation • configurations for reading textbook	• none	• science textbook instructional strategies in place • methods of student science textbook reading achievement • teacher perceptions of student science textbook reading achievement • beliefs and attitudes towards science textbook instruction • teacher goals and needs in science textbook reading instruction
Post 1st Workshop	• rhetorical structure lesson • non-technical terms that signal rhetorical structure • graphic organizer to display key concepts and vocabulary	• instructional strategies implemented • strong and weak points of lesson • science reading assessment • beliefs towards strategy implementation	• instructional strategies implemented • degree of success of strategies and how the teacher measured success • strong and weak points of lesson • science reading • assessment • beliefs towards strategy implementation
Post 2nd Workshop	• rhetorical structure lesson • non-technical terms that signal rhetorical structure • technical vocabulary • graphic organizer to display key concepts and vocabulary • constructed after lesson	• instructional strategies implemented • strong and weak points of lesson • science reading assessment • beliefs towards strategy implementation	• instructional strategies implemented • strong and weak points of lesson • science reading assessment • beliefs towards strategy implementation • configurations for textbook reading
Post 3rd Workshop	• rhetorical structure lesson • non-technical terms that signal rhetorical structure • technical vocabulary; graphic organizer to display key concepts and vocabulary • constructed after lesson • summary of lesson using graphic organizer	• instructional strategies implemented • strong and weak points of lesson science reading assessment • beliefs towards strategy implementation	• instructional strategies implemented • strong and weak points of lesson • science reading • assessment • beliefs towards strategy implementation

For the primary data analysis, I used my classroom observation notes to reconstruct each lesson. I then coded the data within the lesson reconstruction to categorize the specific instructional strategies, the quantity and quality of each teacher's strategy implementation and strategy placement in each lesson (pre-during, post reading.) I also coded lesson observation data to categorize the configurations of textbook reading and hands-on activities connected to textbook lessons.

I grouped the transcribed data from the lesson reflections and teacher interviews separately according to the following categories: (a) instructional strategies implemented, (b) strong and weak points of the lesson, (c) science textbook reading assessment, and (d) beliefs towards strategy implementation and teacher- perceptions of the effects of strategy implementation on their students' reading comprehension. I categorized data collected as a result of probes during individual reflections and interviews separately, e.g., students' ability to read the science text.

For the secondary data analysis, I chronologically organized the qualitative categorical data in a chart; I wanted to discover teacher's progression of strategy implementation and the relationship between strategy implementation and respective belief statements.

For the final data analysis, I triangulated the data within each time block to discover if the data results were consistent across the three sources. For example, I wanted to discover if the teachers implemented the strategies they said they implemented.

***Lesson reflections*.** I analyzed the lesson reflections to discover the instructional strategies the teachers stated they implemented and whether these strategies aligned with ones presented in the professional development workshops and strategies I observed them teach for the respective lesson. I transcribed the lesson reflections to a computer word processing program. I coded the lesson reflection data to: (a) record the instructional strategies implemented during each science lesson and how often, (b) record the teachers' attitudes and beliefs towards strategy implementation as revealed in their responses to questions on the lesson reflection, i.e. "What were the strengths of your lesson? What went well? What didn't go well in the lesson? What will you do differently next time the students read a passage from their science text?" and (c) identify how the teacher assessed student reading achievement as revealed in their responses to the questions on the reflection, i.e. "How did you assess your students' comprehension of the passage? Why did you assess comprehension this way?" I coded the secondary and final lesson reflection data to discover emerging relationships within and between the teachers' attitudes and beliefs towards strategy implementation over time.

Elementary principal interview. The interview with the principal was audio-taped and transcribed in computer word processing program. I coded and categorized responses from the interview to serve as a cross-reference and support for: (a) observed classroom practices in place, (b) responses on lesson reflections and during teacher interviews concerning teachers' beliefs and attitudes towards strategy implementation, and (c) teachers' assessment of student science textbook reading achievement.

***Teacher interviews*.** The interviews were audio-taped and transcribed to a computer word processing program. I coded the interview data to discover: (a) common themes in the beliefs and attitudes towards instructional strategy implementation, and

(b) the relationship between strategy instruction and the teachers' perceptions of their students' reading achievement. I analyzed the data across interviews and lesson reflections within each teacher and across the three teachers. It was also my goal to discover any change in teacher beliefs and attitudes towards instructional strategy implementation across time, and why they constructed these new beliefs.

Classroom observations. The purposes of classroom observations were to discover the quantity and quality of strategies the teachers implemented during science textbook reading lesson. Specifically, I wanted to discover how often the teachers implemented instructional strategies during science textbook reading lessons, if these strategies aligned with the strategies presented in the workshops and were taught in-depth as the instruction in the workshops indicated. I also wanted to discover strategy placement during the lesson (pre-reading, during reading, post-reading). The classroom observations were transcribed to a computer word processing program. I coded the data collection from the observed science textbook reading lessons to: (a) identify the instructional strategies utilized in each lesson, (b) record the number of times the teacher implemented the strategy in each lesson, (c) to evaluate the quality of strategy implementation (i.e. mentioned the strategy, taught the strategy, taught and demonstrated the strategy, taught, demonstrated, and applied the strategy in the lesson), and (d) to identify how the teacher assessed student reading achievement.

I compared the data collection from the classroom observations with the data collection from the teacher interviews and lesson reflections to discover the teachers' fidelity of implementation. Some questions related to fidelity that I examined included:

Did the teachers actually implement the strategies stated in the lesson reflections and interviews? Did placement of implementation align with written reports in the reflections and verbal responses during the interviews? The classroom observations also reported the occurrence and format (formal/informal) of student assessment.

***Validity of qualitative data findings*.** I conducted a validation of findings by a member- check with each teacher. Member checking allowed me to determine the accuracy of the themes represented in the narrative. Another measure to determine the validity of the findings was triangulation within the three sources: classroom observations, lesson reflections and teacher interviews.

Quantitative Data Analysis

Teacher assessments. The small number of teachers (n=3) that participated in the study limited statistical analysis of the pre- and post- assessments. I utilized a rubric (see Appendix B) to score the results of both assessments. I calculated the following descriptive statistics: (a) the average score for each test, with pre-post-test averages compared for each teacher and across the three teachers, and (b) the pre-and post-test averages compared to the overall average of the test scores. Two doctoral students and I independently scored the pre-and post assessments. We compared and discussed the scores and reached a consensus that resulted in an inter-rater agreement of 100%. The comparison of average pre- and post-test scores for each teacher supported the emerging themes in the qualitative data collection.

Chapter Four

Data Collection Results

Qualitative Data Results

The qualitative data collection results are a continuum of observations throughout the study. They are organized in six distinct categories, ordered chronologically according to their occurrence in the study. The categories include: (1) baseline observations, (2) post-first, (3) second, and (4) third professional development workshop observations, and (5) mid-study and (6) post-study interview results.

Baseline Data Collection - Principal Interview

Purpose. I interviewed the elementary principal, Erin (pseudonym) before the first professional development workshop. The purposes of this initial interview were to ascertain:

- the current reading instructional strategies in place in the third, fourth and fifth grade classrooms.
- the content and processes of previous professional development workshops which focused on reading strategies and the principal's perception of the participants' receptiveness to implementing new instructional strategies learned in the workshops.
- the principal's perception of third, fourth and fifth grade students' ability to read and comprehend their science textbook and to discover her goals for the students' science textbook reading comprehension achievement.

- how the third, fourth, and fifth grade teachers accommodate students who are reading below grade level and/or are learning English as a second language and/or are reading below grade level.

Results of principal interview. The results of the initial principal interview provided a baseline of reading strategies in place and a common baseline of the principal's perception of teacher attitudes towards the implementation of new instructional strategies from which I could document observable teacher change.

Prior to coming to Riverton, Erin taught for seven years in K-8 country schools; she assumed a principal's role for the same district before moving to Riverton where she has served as the elementary principal for four years. She stated that she is "more interested in working with teachers and students rather than working on budgets, etc." She earned a Ph.D. in curriculum and instruction with an emphasis in literacy. She explained, "I love to work with teachers on teacher development. I've always been interested in how people read and the best methods out there to assist students that have difficulties with it; hence the focus on literacy." Since assuming her position at Riverton, she has worked with the elementary teachers in examining and applying new reading instructional strategies, specifically during reading instruction time.

Erin stated when she came to Riverton Elementary School, the teachers were "doing whole group instruction in reading" (instructing all students in the classroom concurrently by utilizing one basal reader). To explore alternate approaches to reading instruction, Erin initiated a professional learning community among the teachers where the content of professional books was discussed. With Erin's guidance, the teachers learned and applied the principles of guided reading, a reading approach that was adopted and is currently in practice in all the elementary classrooms at the school.

Next, the learning community read about comprehension strategies focusing on summarization, question and answer development, story grammar, rhetorical structure, visualization, comparing and contrasting, and activating prior knowledge. To facilitate student evaluation during small group discussion and on specific assignments, the teachers developed a rubric to assess the success of each of the reading strategies they were implementing. During the monthly meetings, the teachers brought samples of student work and as a group, used the rubrics to score the samples. The teachers also utilized the monthly meetings to share successful strategy implementation by providing documentation in the form of physical evidence (student work) or by presenting anecdotal documentation on "how things went." Erin stated that all teachers were "held responsible for bringing some ideas and they felt a little out of place if they didn't have anything." The learning community gradually changed from whole group reading instruction to a guided reading approach, implemented newly learned strategies, developed strategy rubrics for student evaluation and shared strategy success with one another.

The rhetorical structure instructional strategies the teachers have implemented focus on narrative text. They have not collectively examined informational rhetorical structures or examined the use of graphic organizers to facilitate their students' comprehension. She explained, "The teachers have done those on their own (graphic organizers). Their social studies textbook series does a really good job of including those." The teachers have not studied and implemented vocabulary strategies which include non-technical terms that signal the rhetorical structure. However, Erin said she has observed the teachers including vocabulary instruction during science reading lessons. She was not familiar the terminology, *non-technical* terms.

Erin explained the reading content in the teachers' classrooms is primarily narrative. Novels are the main reading source for guided reading groups. However, the teachers in the lower elementary grades have been challenged to find novels with appropriate content for the higher achievers, so they "by default, end up doing a lot more nonfiction and the kids love it. They are a lot more interested in it." The fifth and sixth grade guided reading primarily utilizes novels mixed with some nonfiction literature. Although nonfiction literature is included in guided reading groups, the professional learning community has not studied instructional strategies for reading and comprehending informational text.

Erin explained the newly introduced reading comprehension strategies affected the teacher-participants' instructional practices differently; some were reluctant at first. "Once they started to see they [the strategies] could actually make a difference for them, they really started to do more with them. For a few of them, they had to see the benefit. If they weren't going to see the benefit, they weren't going to do it. They told me that straight out." However, when the teachers observed student reading comprehension improvement, they willingly implemented more and more strategies. Some of the teachers were initially enthusiastic and began using the strategies without hesitation. "They could see that we're reaching more kids" with the new strategies and "they went and did it." Erin believes the reluctant teachers ended up "being the ones who did the best job of it (implementing the strategies)."

The teacher-participants measure and track their students' reading comprehension success with a variety of methods. Erin described one participant as being analytical; she tracks the results from formative assessments such comprehension and vocabulary questions. A second teacher utilizes anecdotal notes and running records, while a third teacher feels the conversations she has with the students about their reading is more important than the numbers because during conversations/discussions the students reveal their metacognitive processes in strategy utilization and application. Two of the three participating teachers measure comprehension daily, while the third teacher relies on mental notes and on end-of-chapter tests. It appears that other than administering the Accelerated Readers tests which is consistent across all three grades, each teacher has autonomy in tracking their student's reading achievement which ranges from structured assessment to making mental notes during class discussions. (Accelerated Reader is a computer-based reading assessment system.)

Erin provided her perception of the students' ability to read and comprehend their new science textbook. She stated she had received feedback that indicates the textbook is hard to read. Reading the science textbook differs from reading and comprehending the nonfiction "little readers" used for guided reading groups. Those nonfiction texts are leveled and more closely align with the reading ability of each reading group. As would be expected due to the complex vocabulary, the readability of the science textbooks is higher than the grade for which it was written due to the content vocabulary and many of the students struggle.

Erin believed the students' main roadblocks to reading and comprehending their science text included: (a) the above-grade level readability, (b) the organization of the science textbook, and (c) students differ in background knowledge of science vocabulary. "I think it is a lack of knowledge of how to approach a text like this [science textbook]. It is different to put a little book about a science topic in front of them; there are more pictures and it is organized differently. When you get a textbook it feels different. I think their background knowledge depends on the family. Some of the vocabulary they know right away. Some kids have never heard of any of it. I see vocabulary as being a big stumbling block and just how to approach it."

Erin explained that any child reading below grade level and who has an IEP (individualized education plan) or a 504 plan must be accommodated in the classroom. (The 504 plan refers to Section 504 of the Americans with Disabilities

Act which specifies that no one with a disability can be excluded from participating in federally funded programs including elementary, secondary or postsecondary schooling.) The teacher either reads all or part of the text aloud. One of the participating teachers ordered leveled readers with content that aligns with the topics in the science textbook but is written on several readability levels. However, Erin was unsure how the teacher planned to incorporate the readers into the curriculum. Erin explained there were no ELL (English a learned language) students in 3rd, 4th or 5th grades who required English language instruction so accommodations in these grades were only for students who had an IEP.

Erin would like to see the students become more comfortable reading the science textbooks and any text put in front of them as a result of the professional development workshops. She wanted her students to be prepared to read and comprehend the required texts when they enter middle school. "We always hear that they are not ready when they go to the 7th and 8th grade. They can't read the textbooks." Erin believes the students have the ability to read the texts but are not equipped with all the necessary tools to be successful readers. "I think the ability is there, I really do. For most kids, not all of them, I think to give the confidence, you know, 'Heck, I can read this and I can get it now.' " Since she has been encouraging the teachers to implement new comprehension strategies for narrative text, she hoped the teachers would make connections between them and comprehension strategies for informational text presented in the workshops. "…and I would like to see, just a personal thing, we've talked so much about comprehension strategies in reading and the carry over for some is just a natural thing. Where it just-- ‘Oh, if I do this in reading, this will work in science when I teach this.’ ” She hasn’t observed teachers implementing newly learned reading strategies in the content areas, and she recognizes that some teachers will make the connections between strategies more readily than others.

In conclusion, the elementary principal has provided her staff with professional development opportunities in the form of a learning community for four years to study and implement new reading comprehension strategies for narrative text. As a result, the teachers have adopted the guided reading approach to reading instruction. The degree of new strategy implementation and the participants’ methods to measure comprehension success is varied widely.

The principal felt the lack of student vocabulary background knowledge combined with minimal understanding of the organization of content area textbooks are two major roadblocks to textbook reading comprehension. She hoped the instructional strategies presented in the study’s professional development would provide the teachers with new tools that would facilitate student comprehension of their science textbook. It was her goal to better prepare the elementary students to meet the reading demands in middle school.

Baseline Data Collection - Classroom Observations

Purpose. The results of pre-workshop observations provide a baseline of science textbook reading strategies in place to document observable teacher-change. The baseline science lesson observations took place two weeks prior to the first professional development workshop. Specifically, I was interested to determine if the teachers' lessons included instructional strategies to teach any of the following: (a) rhetorical structure, (b) key science vocabulary terms including non-technical vocabulary terms, (c) graphic organizers to clarify concepts in science lessons, and (d) student summary writing of a lesson. I was also interested to see when in the lesson the strategies were utilized (pre, post or during reading), the specific instructional configurations for science textbook reading (i.e., independently, in small groups, round-robin) and how the teacher measured science textbook reading success. An interest in each teacher's teaching style and delivery of content developed during the baseline observations. In addition, baseline observations provided the students and the teacher with the opportunity to become accustomed to my presence in the classroom.

Science textbook. Riverton Elementary School (pseudonym) adopted the Macmillan/McGraw-Hill, A *Closer Look (*2008) science textbook series the spring prior to this study; the year the study was conducted was the first year the elementary teachers utilized this textbook in their classrooms. Teaching the science textbook lessons would be a new experience for all three teachers.

Science schedule. Science was taught four days a week (Monday through Thursday) in the third and fourth grades and five days a week in the fifth grade. To balance the observations among the three grades, I observed science classes

Monday through Thursday during the two-week baseline observation period (see Table 4.1).

Table 4.1.

Science Instruction Schedule for Third, Fourth and Fifth Grades

Grade	Section	Time
3	B	2:00 p.m. - 2:30 p.m.
3	A	2:30 p.m. - 3:00 p.m.
4	B	12:15 p.m.- 12:50 p.m.
4	A	12:55 p.m.- 1:35 p.m.
5	A	11:25 p.m. - 12:15 p.m.
5	B	1:45 p.m.- 2:30 p.m.

Third Grade

Introduction. Melanie (pseudonym) taught third grade for three years prior to this study. She has the least number of years teaching experience among the three participants. She began teaching at Riverton Elementary immediately after graduating from an in-state University with a Bachelor of Science in Education. Melanie's education-related activities outside the classroom include teaching in Riverton's after-school tutoring program and serving as an assistant middle school volleyball coach during the fall.

Room description. The students' desks in Melanie's classroom are grouped in pods of four to five which facilitate student collaboration and co-operative group work. The pods occupy the front and middle of the classroom, while a table utilized for reading groups and other small group work is located in the back of the room. A large bookcase that stretches across more than one half of the length of the classroom contains an assortment of children's literature. Students utilize bean-bag chairs near the bookcase to read during free time activities. Technology in the classroom is limited to three older Apple computers; a newer computer, primarily for teacher use, is connected to a ceiling-mount projector. Sometimes during science instruction, Melanie projected web-based graphic organizers to guide students while they completed pencil-paper organizers. The white erase boards that line two walls of the classroom were often utilized during science class discussion. A bulletin board by the classroom doorway often contained examples of student work. The room had an organized appearance.

Teaching style. During baseline observations, Melanie appeared to be well-prepared for all her science lessons, having a sense of direction and purpose for each lesson. Her teaching style includes direct instruction, group discussions and a few hands-on activities. Her science lessons appeared to be textbook-driven with discussion and activities following the order of the content of the science textbook. She guided her students through the lessons by providing them with activities that connected and built upon one another.

Rhetorical structure; non-technical vocabulary, graphic organizers. During baseline science lesson observations, I visited Melanie's classroom six times. I did not observe Melanie provide specific instruction in the rhetorical structure of the science textbook nor teach non-technical vocabulary terms to her third graders. On one occasion, she encouraged her students to compare and contrast vertebrates and invertebrates and wrote their responses on the white erase board. However, the white erase board contained a great deal of other information and there wasn't enough room for the teacher to create an organizer. The information she wrote got lost among the information already on the board. During the subsequent science lesson, she repeated this exercise by creating a T chart on the board with the headings, *vertebrates* and *invertebrates.* Melanie asked her students to identify the characteristics of each and then she led a discussion on their similarities and differences. Both activities were post-reading; Melanie did not link these activities to the rhetorical structure of the textbook.

Technical vocabulary. I observed Melanie use multiple methods to teach science vocabulary. During one science lesson, Melanie taught 10 vocabulary words for a particular textbook lesson. Three of the 10 words were listed in the text under the heading, *vocabulary,* so it appeared that the remaining seven terms were teacher-selected. She provided each student with a paper on which 12 boxes each were drawn. She introduced each new term by pronouncing it, asking the students to pronounce it twice in unison and then explained the word's meaning as she created drawings on the white erase board. Melanie then generated a synonym for the vocabulary term and wrote it on the white erase board next to the original vocabulary term. The students were instructed to write the vocabulary term and its synonym in the first box and include a drawing that would help the students remember and understand the term. The students were permitted to copy her drawings from the white ease board. This process was continued until all 10 vocabulary terms had been defined and assigned a synonym and a representative drawing. Melanie explained that the two empty boxes were for students to write other words they considered challenging in the science lesson and instructed them to include a synonym and drawing for the each word. The basic vocabulary instruction was a pre-reading activity while the activity for challenging words was a during- and after-reading activity.

I observed another pre-reading activity during the subsequent science lesson; Melanie taught a vocabulary term by looking at word parts. She focused on the term *classify* for this lesson. She wrote the term on the board and underlined *class*. Afterwards, she engaged her students in a short discussion on the meaning of *class* and then wrote the word, *group,* on the board. She stated that *class* means *group* and to classify means to put into groups. Melanie continued to explain that scientists put animals into groups; they classify them.

Configurations for science textbook reading. The two science textbook science lessons were read in a variety of ways with Melanie typically alternating methods during each lesson. Melanie would read a paragraph orally and then instruct her students to read the next one silently. Sometimes the students would orally read a paragraph in unison with the teacher reading with the students. Other times, a paragraph would be read by the boys reading one sentence, then the girls reading the next sentence, etc. Other times when Melanie read a paragraph orally, she would leave blanks for the students to fill in. (The students needed to be following along in order to fill in the blanks.) She would create groups of students to read orally with her such as, “If you have short sleeves, read the next paragraph aloud with me.” Other times students were directed to read a portion of the text with a partner. I could find no pattern for her choice of how the text was read. Her choices appeared to be random but all with the purpose of keeping the students on task and moving forward with their textbook reading. During baseline observations, the students were not responsible for reading the text in the lesson in its entirety.

Melanie scaffolded the multiple science textbook reading practices in her classroom. She directed the students' attention to read and discuss headings and the captions under photos and drawings. After a portion of the text had been read, Melanie often checked for understanding through questioning. Students were redirected to the text if they were unable to answer a question, sometimes working in pairs or groups to read and find an answer. Other times, the teacher recapped the text for the students after the reading. If students had difficulty pronouncing a word, Melanie would guide them (and all other students) to utilize the pronunciation guide provided in the textbook next to the term.

Assessment. Melanie reviewed the content of chapter one in the science text the fifth day of observations. She provided the students with a packet of papers and encouraged them to complete the packet at home as a means of review for the upcoming test. I was in the classroom when the test for chapter one was given. During the test, several students asked Melanie for the meaning of the term, *similar*. (This term was used in one of the questions on the test.) Melanie eventually directed all the students' attention to this term and provided the definition, *alike.* The test given to the students was generated by the textbook company and was the only formal assessment of science textbook comprehension for chapter one.

Hands-on activities. The only hands-on activity I observed was students planting zinnia seeds in a plastic cup. The students watched the plants sprout and grow. I did not hear Melanie connect this activity to specific textbook content, but discussion centered on the activity could have occurred when I was not in the room. One of the lessons they studied in chapter one is titled, *Plants and Their Parts.*

Class sections. Melanie taught two science sections or classes. The first students (section B) came to her room from the other third grade classroom. Afterwards, her own students returned to the classroom (section A) for science class. The delivery and content of the science lesson were similar between the two sections. However, Melanie treated the two third grade groups differently in the amount of time she spent with each class section. Section B had a 30 minute session for science. The amount of time for science for section A exceeded the 30 minute time period often lasting for 40 to 45 minutes or until the end of the school day. The extra time was used for longer discussions about the textbook content and/or longer time to complete written science assignments.

Summary. Melanie is novice classroom teacher whose approach for science instruction is textbook dependent. Melanie utilized multiple methods to teach key science vocabulary terms. The science text was read in a variety of ways after which the she checked for understanding through teacher- and textbook- generated questions during and after reading. On two occasions, she helped the students sift through and organize the information they had read with compare/contrast activities. She drew attention to the basic organization of the text by asking the students to find and read headings and captions under pictures and drawings before reading the science lesson. She did not teach rhetorical structure of the science textbook or the non-technical terms that signal the relationships in each structure. She utilized a graphic organizer (a T chart) on one occasion to compare and contrast key concepts. During baseline observations, she did not ask her students to write a summary of the science textbook lesson. She assessed science reading comprehension by utilizing a textbook-generated chapter test. She also assessed textbook-generated vocabulary worksheets that accompany each science lesson.

Fourth Grade

Introduction. Becky (pseudonym) is a veteran teacher having taught for 36 years prior to the study. She earned a Bachelor of Science in Education degree from a state University in 1972 and a Master of Science in Education from a private in-state college in 1979. She taught upper elementary education in two rural school districts prior to her teaching career in Riverton which began in 1979. Becky was named Teacher of the Year by the Riverton Jaycees in 1990 and Great Plains Teacher of the Year in 1997. Becky has been a leader in science education for numerous years. Her vitae includes lists of numerous professional experiences which include board member for the State Association of Teachers of Science 1998-2002 and presenter at the annual meeting of the State Association of Teachers of Science in 1992-2008. During the time the study was conducted, she attended two out-of-town science workshops and institutes.

Room description. The content of Becky's classroom reflects her commitment to hands-on science learning. Student desks dominate the center of the classroom and are arranged in pods of four to five students that facilitate small group work. The ceiling-high wooden, built-in cabinets hold a variety of folders, books and education equipment, many of which are parts of science units that Becky has developed throughout the years. Technology for the students is limited to four older Apple computers. A newer computer, primarily for teacher use, is connected to a ceiling-mount projector; Becky used this computer during science class to display instructional activities found on the science textbook's website. Two large tables are located adjacent to one another and behind the student desks. One of the tables is used for guided reading; two aquariums which throughout the study were homes for a variety of animals including lizards, mealy worms and hermit crabs are placed on the other table. Various other kinds of equipment used for science experiments such as test tubes, baggies, paper, and markers are on the table next to the aquariums. At one time, small glass jars containing butterfly chrysalises were on the table. Windows are along one classroom wall under which are a variety of potted plants. Several snake skins are hung on the cupboard behind the teacher's desk. The appearance of the room is a result of many activities and projects in progress.

Teaching style. Becky demonstrated a teaching style that included a combination of direct instruction, hands-on activities and personal narratives and/or stories about events and places directly related to the students. She stated during the baseline interview that "real world experiences" were important for her students, and she often provided connections between textbook content and the students' everyday experiences. For example, when a student read the definition for *spore*, Becky asked the class, "What is on your pizza that has spores?" The textbook was read sequentially but the direct instruction provided during the textbook reading moved from one topic to another. For example, when the students were discussing the characteristics of viruses Becky asked them to compare and contrast microscopes and hand lenses. Afterwards, she described the size, shape and function of convex and concave lenses. The content of the entire lesson was not textbook dependent and included information and anecdotes provided by the teacher. Vocabulary learning was stressed in each lesson and was taught with multiple methods, some of which encouraged deep-processing. Becky appeared to be very knowledgeable about science and well-prepared for each science lesson; she often reinforced science concepts with hands-on activities.

Rhetorical structure, non-technical vocabulary, graphic organizers. During baseline science lesson observations, I visited Becky's classroom seven times. I did not observe Becky provide specific instruction in the rhetorical structure of the science textbook nor teach non-technical vocabulary terms to her fourth graders. She did not utilize graphic organizers to display and organize main concepts found in the textbook lesson. However, during a lesson review, Becky directed her students to look in the textbook at a Venn diagram which compares plant and animals cells. She used the diagram to review the similarities and differences between the two cells. At the end of each chapter, a visual summary can be found. It consists of three or more statements accompanied with an illustration. On one occasion, the students' homework assignment was to copy the three statements and provide an illustration for each. This was the only time the students were asked to do any type of summary activity.

Configurations for science textbook reading. Becky's choice of textbook reading methods was based on the varied reading abilities of her students. During the baseline interview, Becky described her students as belonging in one of two categories: high achieving readers or readers at high to moderate risk; there were no students who could be described as average readers. She stated that she "never really makes them [the students] read it [the science textbook] on their own. I know that fourth graders are not accountable for doing that. They can read it and not have a clue what they have read." This statement suggests Becky believes fourth graders are incapable of comprehending the science text, and this inability is not directly related to the low reading ability levels of current students. Becky's belief statement supports her choice of methodology for science textbook reading: (1) she read the text aloud to the students, (2) she called on students one-by-one to read, (3) she called on student groups to read in unison, and (4) she asked the students to read the text with a partner or with their pod. When she read the text aloud to the students, she instructed them to follow along in their books. When Becky read aloud, she provided her students with a purpose for reading by posing a question and instructing them to listen for the answer during reading. After the reading, the students would either raise their hands to signal they knew the answer or they would write the answer on their personal white erase boards. I observed the students rereading the text on one occasions to find the answer to her question. On two different occasions, after giving her students a homework assignment she instructed them to read their science textbooks for the answers.

Technical vocabulary. During the baseline interview, Becky stated the biggest science reading roadblocks for students who are moderately at risk are the technical terms and "reading a science book is a lot different than reading a novel that they read." She explained that her instructional strategies that facilitate comprehension emphasize vocabulary. During baseline observations, I observed multiple methods for vocabulary instruction. The students were engaged in a traditional method by writing the terms in their "ABC" books (personal science journals) and then copying the definitions from the glossary. It appeared that exact written definitions were required. During one observation, students shared their written definitions. A student read his definition for the term *seed* which he had put in his own words: "A plant that has not grew [sic]." Becky corrected him by providing a definition she read from the book. Despite this apparent rigidity with written definitions, Becky provided many opportunities to incorporate vocabulary terms within the context of hands-on experiments. When setting up an experiment to observe celery changing color as it takes in colored water as compared to celery in non-colored water, she stated, "We changed one thing. What is that thing? It starts with *v*." The students were able to identify the term, *variable* which had been learned in a previous lesson. On another occasion, she gave her students index cards that had vocabulary terms written on them. She directed the students to stand together in front of the room to group like terms together, i.e., cells and tissues, organs and organ systems, etc. I observed other occasions where Becky instructed her students to demonstrate the meaning of vocabulary terms.

Assessment. Becky explained how she measured student science textbook comprehension success. "A lot of it could be verbal assessment. If I talk to them or ask them a question, some of them expound on it and some of them can barely give you a one word answer." I asked Becky how instruction was affected when the overall responses to her questions indicated the students had not learned important concepts. She stated that she would go to "plan B" such as showing them a video or engaging them in another activity. She explained another way she assessed science reading comprehension: "I like to have them sort of summarize. It's like a ticket out of here, you know, tell me a main idea that you learned today in science." Becky's statement suggests she considers providing a main idea is synonymous with summarizing. She stated that she was aware the new science textbook had formal assessments but she had not looked at them yet.

Class sections. Like Melanie, Becky taught two sections of science: students from the other fourth grade classroom (section B) and her fourth grade students (section A). The delivery and content of the two sections were similar. However, Becky treated the two fourth grade sections differently in the amount of time she spent with each during baseline observations. Section B had a 35 minute session for science class; section A exceeded the 35 minute time period, often lasting 45 minutes. During the baseline interview, Becky stated that she teaches science all day long. "If there is a teachable moment, you go with it."

Summary. Becky is a veteran teacher whose method for science instruction incorporates multiple approaches. During science lessons, she provides direct instruction for her students during which she imparts much of what she knows about a topic; she integrates stories of personal experiences to provide her students with connections between the text and real life events. Becky strongly believes in hands-on experiences to teach science; her room is filled with many science experiments in progress. She sees technical vocabulary as being a major roadblock to science textbook comprehension and therefore has a strong belief in teaching vocabulary to facilitate students' science textbook reading comprehension. Becky utilizes a combination of traditional and deep processing methods of vocabulary instruction. She stated her belief that fourth graders are unable to read the science text on their own and consequently, she read the text to the students or called a range of average to advanced readers to read the text aloud. During the initial interview, she could not clearly define rhetorical structure nor did she teach rhetorical structure during science lessons; she had a vague definition of graphic organizers and their purposes. Becky stated she evaluated students' text comprehension through verbal assessment, and their responses determined whether she would use another medium to re-teach the concepts.

Fifth Grade

Introduction. Jody (pseudonym) taught school for 24 years prior to this study. She earned a Bachelor of Science in Behavioral Science from a local private college and a Master of Education with an emphasis in school counseling from the state college. She began her teaching career in a small rural school district in this state, teaching fourth, fifth and sixth grade art, science, physical education and health for three years. Afterwards, Jody taught for 17 years in various small elementary schools in the Riverton district prior to the district's consolidation. After Riverton's consolidation, Jody's teaching duties include taught fifth and sixth science, art and one guided reading group. Throughout her teaching career, she taught all elementary grade levels with the exception of Kindergarten. She was appointed director of the Riverton's elementary science fair the year of the study. She stated her love for teaching science began the first three years she taught school; the school was departmentalized and she was responsible for teaching science to all fourth, fifth and sixth grade students.

Room and schedule descriptions. The educational schedule for all fifth and sixth grade students at Riverton aligns more closely with a typical middle school format. Three 6th grade teachers share instructional responsibilities and the students move from classroom to classroom every 45 minutes. Jody is responsible for teaching both sections of fifth and sixth grade science for a total of four science classes a day. As a result, Jody does not have a class that can be classified as “her students.” Jody’s classroom has an overall orderly appearance; it is arranged in a traditional manner that accommodates the groups of students that move in and out of her room several times a day. Student desks occupy the majority of the space in her classroom and are arranged in rows. There is an overhead projector on a portable cart in the front of the room; the overhead projector was utilized often during science lesson observations. A table for guided reading instruction occupies a corner of the front of the room. The technology for the students is limited to four older Apple computers. Plants grown under fluorescent lights and other “in-progress” science experiments are placed under a cupboard in the back of the room. Empty spaces on the walls are used to display student work. White erase boards line two classroom walls; a bookshelf located under one of the boards contains selections of children’s literature and science supplementary reading material. The ongoing science projects and science posters on the walls indicate science is a primary topic of instruction in this classroom.

Teaching style. During baseline observations, it appeared that Jody was well-organized and had a strong sense of purpose and direction to achieve specific learning goals. She utilized supplementary reading material such as topic-related non-fiction books from the school library, and she initiated several hands-on activities to reinforce specific science concepts. The state science assessments are given in the fifth grade and during the study, Jody referred to the science assessment as the basis for the design and the content of her science curriculum. Therefore, not all of Jody's science lessons were textbook-dependent nor did she teach science in the sequence of lessons presented in the textbook.

Rhetorical structure, non-technical terms, graphic organizers. During baseline science lesson observations, I visited Jody's classroom eight times. Her lessons were based on the supplementary pages found in the back of the science textbook; she did not teach any of the regular textbook science lessons. The students were studying systems in the human body and Jody stated she felt the students needed to learn more content than the regular textbook offered in order for them to do well on the state science standards test. During the first day of observation, Jody said, "We are going to continue working on body systems because of our state test." The textbook devotes only one or two pages to each system (i.e., skeletal system, circulatory system, etc.), so Jody taught the human body systems by utilizing supplementary reading material, videos, hands-on activities as well as the supplementary reading material in the back of the textbook.

The fifth grade students read from their science textbook on two occasions during baseline observations. When the students read from the text, I did not observe Jody provide specific instruction in the rhetorical structure of the science textbook or other reading material, teach non-technical vocabulary terms, or utilize graphic organizers. However, I did see student drawings of plant and animal cells displayed on the walls;

each student had drawn a plant cell and animal cell side-by-side, but did not reference any comparisons or contrasts. During the initial interview, Jody indicated she did not have knowledge about rhetorical structure or instructional strategies for teaching it. However, when she read information books aloud to her students, she differentiated informational and narrative books: “You need to pay attention to the book and the questions. This is a nonfiction book and nonfiction books are usually harder because they are usually written on a little bit higher level.”

Configurations for science textbook reading. Jody called upon students one at a time to read the science textbook. Sometimes Jody would stop a student mid-sentence while he was reading and call upon another student to continue reading where the first one had stopped. During the reading, Jody reviewed and checked for understanding through short question and answer sessions. On one occasion she wrote vocabulary terms on the white erase board during the discussion. Jody also directed the students to examine photos in the text.

During the baseline interview, Jody stated the science textbook was typically read by “going from student to student.” She said this method allowed for discussion as they read and it also “allows students who have a lower reading level to hear the text being read.” Jody stated that later in the year, the students would read the textbook in small groups. Jody felt the new science textbook was easier to read than the old one; she estimated that “80% of the kids probably could read it on their own and get what they need from it.” She remarked that learning to use a textbook is vitally important, and she teaches her students specific study skills such as to read headings and captions under photos to facilitate finding answers in a book. Jody also stated she gives students a lesson outline to complete as a homework assignment and by completing the outline, the students learn how to find answers in a textbook.

Teaching style. Jody utilized several books from the Accelerated Reading program such as *Heart* by Seymour Simon as supplementary material in the students' study of human body systems. She read three of the books aloud to her students; on another occasion the students read other books authored by Seymour Simon in small groups of four to five students. Before she read the first AR book, she told the class, "We will read *Muscles.* This is a nonfiction book. Even though it is a small book, nonfiction books are harder and your test scores (AR scores) might not be as high." It took more than 20 minutes for Jody to read *Muscles* aloud and the students appeared to grow restless before she finished. The reading was followed with a discussion and question-answer session. The students took the computer-generated AR test immediately following her reading it to them. On the last day of baseline observations, Jody read the AR book, *Heart* aloud to her students. Before the reading, she provided her students with a list of questions and stated that she would not stop reading when she came to an answer to a question. During the reading, on two occasions, students asked her to reread a page and she declined. However, she did explain the information in the book as she read. At one point, she asked her students if they were "lost," and several students admitted they were confused. She stopped reading, turned on the overhead projector and used a diagram on a transparency to trace the path of blood through the heart. She used the analogy of the blood vessel system to a tree with a main trunk and main branches.

Technical vocabulary. Since Jody did not teach a science textbook lesson during baseline observations, I did not observe her methodology for vocabulary instruction. However, one homework activity required the students to identify the major bones in a human skeleton. The students were instructed to cut out the bones printed on one sheet of paper, arrange and paste them on another paper to create a human skeleton and then to label the bones by cutting out and pasting the terms printed on a third sheet. She labeled this activity as a vocabulary assignment. During her initial interview, Jody stated that she used vocabulary worksheets for the students to know and understand the vocabulary. The formats of the worksheets are matching terms to definitions or crossword puzzles. She stated that she also used an online vocabulary game found on the textbook company's website.

Every Wednesday is allotted for L to J vocabulary practice. The theory of L to J vocabulary learning is based on students experiencing multiple exposures to pre-selected vocabulary terms and definitions regularly throughout the year. Before the school year began, Jody determined that student knowledge of 150 pre-selected science terms would contribute to student success on the state science standards tests. At the beginning of the school year, she provided her students with a list of the terms and informed them they were to study the words and their meanings. Every Wednesday, 15 of the terms' definitions are randomly selected; the teacher reads the definitions one-by-one and the students write the term that matches each definition on a sheet of paper. After the quiz, the students and teacher review the 15 terms and definitions after which the students determine how many correct answers they had. The collective scores are recorded on graph paper. The students match terms and definitions one day a week throughout the year; the theory of this vocabulary learning approach is the more the students practice matching terms and definitions, the more vocabulary they will learn. Approximately 30 minutes of class time, once a week is devoted to L to J vocabulary learning.

Assessment. Jody stated that she uses multiple student assessments that include verbal question and answers for review after the text has been read. She grades all homework assignments which range from completing an outline of a science lesson to vocabulary worksheets. In reference to classroom assessment, Jody said the students were preparing for their state standards science tests; she knows all the questions on the test so throughout the year she orally reviews the questions with her students.

Class sections. During baseline observations Jody spent the same amount of time with both sections of fifth grade science. The only noticeable variation of her science lessons were a result of differences in the questions and answers the students generated. The content and sequence of the lessons in both sections were very similar.

Summary. Jody is a veteran teacher who utilizes multiple resources for teaching science content. She delivers content through textbook and supplementary book reading, direct instruction, videos and hands-on activities. The content of her science curriculum is driven by the questions on the state science standards test given in the fifth grade. She estimates that 80% of her students are capable of reading the textbook; the students read the science textbook in a round-robin fashion. Jody did not specifically teach vocabulary during baseline observations but stated in the initial interview that she used vocabulary worksheets during regular science lessons. She also utilizes the L to J vocabulary method for overall science vocabulary instruction. I did not observe Jody teach rhetorical structure, non-technical terms or utilizing graphic organizers to clarify textbook content. Jody assesses students' science reading comprehension by tracking their AR reading scores, assessing vocabulary worksheets and end-of-lesson quizzes.

Post-First Workshop Observations

Introduction. The research-based (Duke, 2000; Harniss, Dickson, Kinder, & Hollenbeck, 2001) rationale for the first professional development workshop emphasized the need for informational text comprehension instruction in elementary classrooms to prepare students when they encounter informational texts as part of the curriculum. Students require specific skills and strategies to comprehend informational text structure (Duke, 2004; Harniss, Dickson, Kinder, & Hollenbeck, 2001). These skills and strategies include: (1) understanding the various forms of informational text structures (Armbruster, Anderson, & Ostertag, 1987; Berkowitz, 1986; Duke, 2000; Taylor, 1980), (2) identifying the non-technical terms that signal the text structures (Merkley & Jefferies, 2000), and (3) displaying key concepts and the technical and non-technical terms in graphic organizers (Alvermann & Boothby, 1983). Student acquisition of reading skills and strategies begins with teacher instruction, modeling and scaffolding followed with student practice and gradual acquisition of responsibility for strategy implementation (Pearson & Gallagher, 1983; Pressley & Wharton-McDonald, 1997). My post-first workshop observations were conducted to discover the quality and quantity of the three instructional strategies the teachers incorporated in their science textbook lessons. I observed the teachers for a four-week period between the first and second professional development workshops.

Workshop goals. Staff development is most powerful when it focuses on results that can be expressed in terms of student achievement (Guskey, 2003a; Rude & Brewer, 2003). At the end of the first professional development workshop, he three teachers collectively identified four goals they would like to achieve (see Figure 4.1).

1. The students will be able to make a question that they need to answer and then read to answer that question.
a. The students will know it is okay to re-read to find an answer and okay to use a partner.
2. The students will know where to go back to find an answer; to use the headings, key words.
3. The students will read to make a connection and be able to answer implicit questions.
4. The students will learn to be independent learners.

Figure 4.1. Learning Goals

Establishing goals encouraged additional conversation among the participants. Collectively, they decided the biggest problems their students' experienced when reading the science text are: (a) the absence of recall of what they have read and, (b) lack of skills to read the science text independently.

Third Grade Lesson Observations

I observed Melanie teach three complete science textbook lessons. My observations included 6 sessions in section A and 7 sessions in section B. The content and delivery of content was similar in both sections. However, section A, (Melanie's own class), consistently lasted 5 to 10 minutes longer, providing the students with more time to discuss the content of the textbook lesson and/or complete written work.

Chapter two - lesson two. Melanie was the first teacher to invite me to observe a science lesson; this lesson was taught one week after the workshop. The third graders were beginning the lesson, *Animal Life Cycles.* Melanie had identified the lesson's text structure as sequence.

Text structure mini-lesson; non-technical terms. Melanie began the lesson by assessing her students' prior knowledge through questioning. After the pre-reading discussion, Melanie told her students she was going to read them at book she had written. She explained the book was not a science story but was a familiar story, *Goldilocks and the Three Bears.* She informed her students that something called *sequence* was going to be in the story which meant "something was going to happen and then next something else was going to happen and then at last, something was going to happen." Melanie pointed to a paper chart where she had written the title, *Sequence.* She continued, "So, I want you to be listening for words that tell you what happens first, what happens next and what happens at the end of the story." Melanie read the simplified story emphasizing the words *first, second, next* and *last* with her voice. After she read each page, she asked her students to identify the word(s) that signaled the order of events in the story. As the children identified the sequence words, she wrote them on the chart under the heading, *Sequence.* She continued this process until the entire story had been read and all the sequence terms identified and written on the chart. The sequence words charted were *first, next, then, last* and *finally*.

Science lesson - text structure. Melanie directed her third graders' attention to the first two pages of lesson two. She stated that the current science lesson would tell about events in animals' lives and the events were in order or had a sequence. She asked her students to listen as she read the paragraphs so they could identify any words that signaled sequence. Melanie read the two pages, pausing when the students raised their hands to indicate they had found a sequence word. A discussion would follow after a student named a word and the students, with teacher-scaffolding, collectively decided if the word did signal the order of events. During this exercise, the term *in time* was added to the sequence term chart.

The students then studied the life cycle of a frog by looking at the illustrations in the book while the teacher read the captions. As the students discussed the life cycle, they added the terms *to start, to begin with, now,* and *in the end* to their chart of sequence words.

Graphic organizer. Melanie directed her students' attention to a cycle graphic organizer on the white erase board that included four empty boxes evenly spaced around a circle and numbered consecutively 1 through 4. For the conclusion of the lesson, the students collectively, with the support of the teacher, labeled the four stages of the life cycle of a frog utilizing the sequence words found on the sequence term chart. As the students provided answers, Melanie wrote the labels for each portion of the cycle on separate pieces of construction paper and taped the labels in the appropriate boxes on the cycle organizer.

Graphic organizer and non-technical terms. On the second day of the lesson, Melanie reviewed the life cycle of the frog. Melanie had drawn an organizer on the white erase board but she had removed the labels; the labels were taped in a random order on the board. She directed the students to open their science texts and asked them to identify the first step in the life cycle, emphasizing the word *first* with her voice and directing them to refer to their texts as a reference. As each step in the cycle was identified, the paper label was removed and taped in the appropriate box. Then Melanie directed her students to repeat this exercise by labeling a new cycle graphic organizer for the life cycle of an insect which was drawn on the white erase board. The teacher once again emphasized the sequence words and directed the students to the textbook for answers.

Technical terms. As the students labeled the life cycle for insects, Melanie discussed the vocabulary terms, *larva*, *pupa*, and *metamorphosis* with the students by asking them to read the terms in context and define the terms using their own words; these vocabulary words and the non-technical terms were incorporated into the graphic organizer.

Release of responsibility. Melanie directed the students' attention to the heading on the subsequent page in the text, "How do reptiles, fish and birds change as they grow?" She pointed out the life cycles for reptiles, fish and birds are similar. Giving each student two blank copies of a cycle graphic organizer, she directed the students to read silently to discover the first two stages in the life cycle of these animals. After reading she asked, "What did you find?" There were few student responses, so she directed them back to the text to reread the first paragraph and to look for sequence words as clues. The students were successful in identifying the first step; Melanie labeled the first step on the organizer drawn on the white erase board and directed the students to label their paper organizer by copying her label. This process was repeated until the graphic organizer had been completed, with Melanie gradually releasing the responsibility of the organizer completion to her students. The lesson was concluded with the teacher and students studying textbook illustrations and reading about the life cycle of a sea turtle and the life cycle of a trout.

Review. Melanie reviewed the words on the sequence term chart with her students at the beginning of the third day of the lesson. She also reviewed the three life cycle graphic organizers they had created collectively. The students read the remaining pages of the lesson and completed a life cycle organizer within their learning pod groups. After all the pods were finished, the whole class completed a master organizer drawn on the white erase board using the answers they had written on their personal organizers. She wrote their answers on the master organizer; they were permitted to change or add to the answers on their own organizers as class members contributed answers.

Configurations for textbook reading. Melanie read part of the textbook lesson aloud. Other times, she directed her students to read portions of the lesson silently. The students also read the text aloud with their learning pod partners.

Lesson reflection. Melanie completed the lesson reflection three days after she taught the last session for lesson two. Her responses to the lesson reflection questions follow.

- Rhetorical structure: Melanie's rationale for teaching sequence was "mainly because that was the way in which this particular text was set up."
- Graphic organizer: Melanie indicated the cycle graphic organizer was the best fit to display the sequence of animals' life cycles. She stated the organizer was the first one "we used this year; I did it as a whole class and I did the writing."
- Assessment: Melanie's student assessment was "mainly observation of students as they read and spoke in groups about what they read. We really did not have time to do a written task of any kind, so I made notes of time on task, participation, etc."
- Strong points of lesson: Melanie stated she taught the science lesson in the same manner to both classroom sections but she felt section A, (her own class), stayed on task better and had more background knowledge.
- Weak points of lesson: Melanie was concerned the lesson was divided into too many sessions. She would like to have her students read the text independently but at this point, she isn't confident they could handle the vocabulary. "I guess I'm trying to balance scaffolding with independence which is something that'll hopefully get easier with time."

Chapter two - lesson three. The main idea in this lesson titled, *From Parents to Young,* is organisms have traits inherited from their parents and have traits that are learned. Melanie determined the rhetorical structure for the lesson is main idea/detail.

Science lesson - text structure. Melanie began the lesson by directing the students' attention to the first heading in the chapter, "*What are inherited traits?"* She wrote the term "inherited" on the board and drew a box around it and stated the term was the main idea for the lesson; she instructed the students to listen for the meaning of the term as they read the lesson. The students read the first two pages of the lesson aloud after which Melanie stated, "Inherited is kind of the main idea. We know that inherited means 'comes from the parents to young.'" She explained the textbook gave many examples of inherited traits and directed her students to return to the text to find these examples. As the students provided examples such as, eye color, hair color, number of legs, Melanie drew an arrow from the box containing the term, "inherited" and wrote the example next to the arrow. Melanie continued to redirect the students back to the text to reread and find examples of inherited traits. When the class was finished with their discussion, there were multiple arrows, each with an example, connected to the main idea. Embedded in the classroom discussion, the students examined the terms *inherited trait* and *offspring* by reading them aloud within the context of the lesson and then discussing their meanings. Melanie concluded the lesson by asking the students, one-by-one to identify the main idea of the first part of lesson three.

Graphic organizers; non-technical terms. On the second day of the lesson, Melanie reminded the students about the process they utilized in creating the sequence term chart for their classroom. She presented a blank paper chart with the title, *Main Idea* written at the top. She wrote one word under the title, *example* and explained, "When you see the word *example* in your science or social studies book, it usually means there is a detail coming up." She provided the students with three graphic organizers each in the shape of a suitcase and explained each suitcase represented a main idea. The computer image of the organizer was projected onto an overhead screen. She typed the words, *Inherited Traits* above the first suitcase and asked her students to name examples of inherited traits they had read the previous day. Melanie typed the examples as the students named inherited traits. The students were directed to copy the examples onto their own graphic organizer.

Release of responsibility. For the next step, she directed her students to silently read the two paragraphs on the last page of the lesson after which she asked them to identify the main idea. The students identified the second main idea and provided examples. Melanie prompted the students to look for the term “example” which signals a detail for the main idea to help them sift through the information in the text and determine the details for the second main idea. This process was repeated for the final paragraph of the lesson.

Lesson reflection. I conducted a lesson reflection interview one week after Melanie taught the last session for lesson three. Melanie’s responses to the lesson reflection questions follow.

- Rhetorical structure: Melanie stated she felt the students did not need a mini-lesson for, main idea/detail, because they had discussed this particular structure during guided reading class with fictional text. Also, her students had to utilize main idea/detail in writing class. She identified main idea/deal as the rhetorical structure for this lesson because the textbook company had recommended it as the target reading skill for the lesson and she felt this structure was an appropriate fit.

- Graphic organizer; non-technical terms: Melanie identified *example* or *for example* as the only main idea/detail nontechnical terms for this lesson. She stated having only one non-technical term for the lesson was detrimental in the students' identification of the details in the text that were associated with the main idea. "They were looking for that word and when it wasn't there it – I don't know that they knew automatically that it was an example or detail. If they [the examples] were pointed out they could maybe figure it out but not right away." However, she did feel the suitcase graphic organizer facilitated the students' comprehension. "I think it is great for them. You know, as a class, it's wonderful because they get to actually see it put together in a way that just in a paragraph it's hard to tell for a lot of kids; it's hard to comprehend, I guess."
- Assessment: Melanie stated she measured reading comprehension success by observing student participation and listening to oral contributions during class discussions. With the completion of lesson three, the students would soon be taking the test over chapter two.
- Strong points of lesson: Melanie commented on the transfer effect on the students' identification of sequence words. She explained that students in her high ability reading group had identified sequence words in fiction books during guided reading. She stated that she was anxious to observe if the students used the words *example* or *for example* in their expository writing.

- Weak points of lesson: Melanie commented planning and teaching the two lessons with the newly learned instructional strategies had taken more time to plan and teach.
- Belief statement: Melanie felt taking the time to plan and teach lessons that incorporated rhetorical structure, non-technical terms and graphic organizers planning was worth the effort. “Well, the kids were involved. They got more out of it and it was all on one page.” She explained the completed graphic organizers would be sent home for the students to study in preparation for the upcoming test.

Chapter three - lesson one. The main idea of the lesson, *Food Chains and Food Webs*, is organisms in an ecosystem depend upon each other; it was taught during two separate classroom sessions.

Technical terms. Melanie began lesson one by assessing her students’ prior knowledge about the vocabulary terms listed in the margin of the textbook on the first page of the lesson. Individual students identified *habitat* and *consumer* as terms with which they were familiar.

Science lesson- text structure; graphic organizers. Melanie determined the text structure for this lesson was main idea/ detail. She wrote the term, *ecosystem*, on the board, pronounced it, and drew a box around it. Melanie directed her students to read the text silently to discover the meaning for the term. After the students read the text, they offered several ideas to define ecosystem which Melanie labeled as examples of an ecosystem. She wrote each example within a box connected and adjacent to the large definition box. She stated that the students had found examples of ecosystems but had not yet defined it. She directed the students to read the sentences before and after the highlighted term, ecosystem, in the text to find the definition. The students read and worked together for a few minutes but no one produced a definition. Melanie directed the students to a sentence, “Living and nonliving things that interact in an environment make up an ecosystem.” The students and the teacher, in unison, read the paragraph containing the definition of ecosystem. Melanie asked the students, “What two things *interact*? *Interact* means to work together. What two things would *interact* to make an ecosystem?” After the students provided a correct response, she directed them to read the succeeding two paragraphs with a partner for the purpose of finding examples of living things and non-living things. After reading, the students provided the examples which Melanie wrote in the boxes of a graphic organizer drawn on the board. She provided the students with their own graphic organizers and directed them to complete it by copying from the board. The organizer was shaped like a matrix but was utilized to identify main ideas their details (see Figure 4.2).

	What is it?	Living Things	Non-living Things
Ecosystems			
Examples			

	What is it?	Producers	Consumers	Decomposers
Food Chain				
Examples				

Figure 4.2. Food Webs and Food Chains

Release of responsibility. At the end of the lesson, the students were directed to read the next two pages in their text and complete graphic organizer for the terms, food chain, producer, consumer and decomposer for their homework assignment.

Review. The second day of the lesson began with a short review with Melanie asking the students for the meaning of the term *ecosystem.* Then students checked their homework; the students supplied the answers they had written in their matrixes and Melanie wrote their answers in the matrixes drawn on the white erase board. Students were permitted to change or add to their answers.

Technical and non-technical terms. The review of homework involved an extensive discussion of the four vocabulary words with the teacher asking for specific examples from the textbook. The terms were repeated multiple times as students cited examples for each. Melanie re-emphasized the non-technical term, *example,* by asking, "Who saw the word *example* in your reading?"

Modeling cognitive processes. The lesson also included the teacher modeling cognitive processes. Melanie asked the students to explain how they found an answer in the text. For example, one student explained she found the definition for *decomposer* in the text because it was a highlighted word. The teacher modeled the cognitive thought process by saying, "Then you read the words around it. Read the sentence that has the highlighted word to find out what it is. Usually examples follow the definition."

Graphic organizers. For the second part of the lesson, Melanie instructed her students to study a large, complex web organizer in the text book; the organizer showed a food web. The students were directed to trace the arrows and discuss, with their pod mates, the concepts displayed in the web. Melanie walked around the room, monitored the conversations, and added questions.

Release of responsibility. At the end of the lesson, Melanie directed her students to read the text on the pages where the food web was displayed and then complete the remaining main idea/detail matrix (see Figure 4.3).

	What is it?	Predators	Prey	Herbivores	Carnivores	Omnivores
Food Web						
Examples						

*Figure 4.3.*Main Idea/Detail Matrix

Configurations for textbook reading. The students read part of the lesson with a partner; the students read the remaining sections silently.

Lesson reflection. Melanie completed the lesson reflection two days after she taught the last session for lesson one. Her written responses to the reflection questions follow.

- Rhetorical structure: Melanie identified the rhetorical structure as main idea/detail. She described how she determined the lesson was written with this rhetorical structure: "I guess I did this by the process of elimination. Nothing really was compared and it was not a time-order (sequential) structure. Main idea/detail seemed to fit the best with the way the text was written."
- Graphic organizers: Melanie used organizers to help her students differentiate the main ideas from the details. "I tried to teach them the difference between a definition, ("What is it?"), and the examples a book can sometimes give – what is a producer vs. some examples of producers." She explained that distinguishing between the definition and examples was difficult for the students because the textbook didn't use the non-technical terms *example* or *for example.*
- Assessment: Melanie's assessments of student achievement included observations of student understanding of main idea/detail through their oral responses during discussions and written responses on the matrix homework assignment.
- Strong points of lesson: Melanie felt that the strength of this lesson was the matrix organizer.
- Weak points of lesson**:** Next time Melanie teaches a science lesson with a graphic organizer, she will discuss the purpose and importance of organizers with her students.

- Belief statement**:** Melanie felt, at this point in the year, her third graders didn't know how to utilize graphic organizers as a comprehension aide: "They don't see graphic organizers (yet) as a way to better understand what they read (sift out what's important)." At this point, she felt her students used the textbook to complete the matrixes, as opposed to completing the matrixes to better understand the text. Melanie reflected on future lessons; she would discuss the importance and purpose of organizers with her students. She stated the matrixes were useful in this lesson because "it gave the students a chance to go over the content in another modality (writing) as well as listening on the ones we did together."

Fourth Grade Lesson Observations

I observed Becky teach part of three science textbook lessons. My observations included five sessions in section A. A situation came to my attention that would have been a major drawback for my study. Becky had a student teacher in the classroom who would eventually assume the responsibility for teaching all areas of the curriculum. Becky volunteered to help me by continuing to teach science to her own fourth graders throughout the semester; the student teacher taught the science to other fourth grade class. Therefore, my observations focused on her own class of fourth graders (referred to as section A) thus limiting the number of my observations.

Chapter one - lesson four. Becky invited me to observe a science lesson one week after the first professional development workshop.

Hands-on activities and technical terms. Becky began the science lesson by sending the students out of the room to retrieve their handy gardens, an activity where the students had placed a cotton ball and a different seed in the tip of each finger of a clear plastic glove. After the students returned to the classroom, Becky reviewed the vocabulary term, *germination* from the textbook lesson titled, *How Seed Plants Reproduce.* She asked each student to share observations of their handy gardens using the term *germination.* Seven of the twenty students used the term in context. After this exercise, Becky shared a story about her father testing wheat seeds before planting. As she told the story, she prompted her students to fill in blanks in her narration with the term *germination.* Becky reviewed the term *hypothesis* by asking the students to make a hypothesis about their handy gardens; the students began each sentence with, "My hypothesis is…." (Hypothesis was a vocabulary term from a previous lesson.) The students wrote observations of their handy gardens in their science journals and then returned their germination experiments to their original location. Next, Becky reviewed the parts of a flower by referring to a model the students had made previously from candy and other food items. Before moving on to the final part of the lesson, Becky asked the students, "How is reading a science book different from reading *Kickoff?"* (Becky did not explain why she asked this question nor did she identify where *Kickoff* fit in the curriculum.) Several students indicated *Kickoff* was fictional and the science book was factual.

Graphic organizer –purpose for reading. Becky gave a card with a printed question to each pod of four to five students; each pod had a different question. The students were instructed to read the text to find the answer to their question and write the answers on another card. The students worked in cooperative groups to read the text passage assigned to them. When the students finished, they took turns presenting their answers to the rest of the class and placing their card in the pocket chart. The questions were taken from the last five pages of the lesson in the textbook so apparently; the first part the textbook chapter had been read and discussed prior to my invitation to visit.

On the second day of the lesson, the students examined their handy gardens and wrote their observations in their journals. Becky informed her students would they review the chapter the next day and then take the chapter test the day after the review.

Lesson Reflection. Becky completed the lesson reflection two days after the final science lesson. Her responses to the reflection questions follow.

- Rhetorical structure: Becky indicated the rhetorical structure she taught for this lesson was cause and effect because it was a "perfect fit into why some of our seeds grew and some didn't."
- Non-technical terms**:** Becky described how she taught non-technical terms as part of the rhetorical structure lesson. "We have discussed it previously in reading group, so it was a natural flow with some real world applications!" Since I was not invited to observe this science lesson from the onset, I cannot ascertain she taught rhetorical structure and the appropriate non-technical vocabulary. Her responses to interview questions suggest she did not teach the lesson's rhetorical structure or non-technical terms since the cause and effect was identified in relation to an experiment and the non-technical terms were a topic of discussion in a reading group.

- Graphic organizer***:*** Becky indicated she considered the pocket chart to be a graphic organizer even though the questions and answers focused only on part of the lesson.
- Assessment: Becky assessed her students' comprehension of the text by listening as they responded.
- Strong points of lesson**:** Becky said the strengths of her lesson were "real world ties" and the students "like to do group work."
- Weak points of lesson: When asked what part of the lesson did not go well, Becky responded that her students "still have to learn to let everyone contribute in groups."

Addendum. In response to Becky's lesson reflection, I asked her to examine the text passages in the subsequent lesson, determine the rhetorical structure and plan the instructional strategies she would implement to facilitate her students' understanding of the rhetorical structure. I also suggested she use a paper-pencil graphic organizer; I gave her two sample organizers. I emphasized these organizers were samples and I encouraged her to develop her own. However, I did give her permission to use either of the samples.

Chapter Two - Lesson One. Becky invited me to observe a science lesson two weeks after my last observation. Becky did not explain to me why there was a delay between the two lessons. Again, instead of inviting me to observe the first day she taught the lesson, she asked me to observe on the second day of the lesson. Consequently, if she taught rhetorical structure or non-technical terms at the beginning of the lesson, I was not there to observe this instruction.

Technical terms. Becky began the lesson by reading vocabulary terms on commercially made cards; each one was printed on a separate card and fit into the pocket chart. After she read the word, she called upon a pod of students to read the definition in unison; the definition was printed on a different card and placed in the pocket chart opposite the card with the vocabulary term. She continued this exercise until each term and its definition had been read out loud twice.

Science demonstration and graphic organizer. Next**,** Becky conducted a demonstration which showed how jellyfish move through the water. After a short discussion, she asked the students to turn to the third page of the lesson. She read the boldfaced headings to the students and they repeated them aloud. Then, Becky directed her students to read the photograph captions silently. She stated, “This is how the information in this chapter is organized.” Becky read the first two paragraphs aloud. She gave a matrix to the students which provided spaces for sponges, cnidarians, mollusks, echinoderms, arthropods and worms to be compared and contrasted by describing their body parts and environments. The matrix is one of the graphic organizers I had given to Becky as a sample (see Figure 4.4). Becky guided the students in completing the part of the matrix for sponges by referring to information in the text and then instructed them to finish the rest of the matrix independently or by working with a partner. While the students were completing the matrix, I noticed some of them were looking around the room and/or referring to the terms in the pocket chart but were not using their textbooks to read and find information.

Classification	Sponge	Cnidarians	Mollusks	Echinoderms	Arthropods	Worms
Looks like:						
Where they live:						
Special fact:						

Figure 4.4. Invertebrates (animals with no backbones)

Relationship between text and graphic organizer. The students were dismissed for recess 45 minutes after the onset of the lesson. During the recess break, I visited with Becky and shared my observations of students not using the text to complete the matrix. Becky agreed that not all of the students knew where to go in the text to find the answers. It was her hope that eventually all students would be able to complete an organizer independently. I asked Becky how she could help her students become independent readers. She believed since they had completed the first part of the organizer together, the students should be able complete the rest of it independently. Becky said that she would continue to help the students with organizers.

I suggested more than one rhetorical structure was present in the lesson text. I informed her multiple rhetorical structures had been found within one lesson in other grade-level science textbooks. She responded, “All in one lesson?” When I affirmed this notion, she stated she thought the fourth grade book was pretty consistent with rhetorical structure within lessons.

Configurations for textbook reading. My observations did not include the students or the teacher reading the science textbook lesson. I observed some of the students perusing the textbook to find answers to complete the matrix.

Lesson Reflection. I conducted a lesson reflection interview with Becky two days after the final science lesson. Her responses to the interview questions follow.

- Rhetorical structure: Becky stated the rhetorical structure she taught for the lesson was compare and contrast and the reason she chose this structure was "because we were looking at all the invertebrates and it was a good way to look at them by comparing them all, seeing how they were alike and different. I think the kids kind of came to that as they did the organizer."
- Non-technical terms: When I asked Becky if she specifically taught any non-technical vocabulary terms for compare/contrast, she said, "No, I think on the board we did have important vocabulary. I guess when we started it, I just reminded them what compare and contrast was."
- Graphic organizer: I asked Becky if she thought the matrix helped the children understand what they were reading or not. She answered, "It gave them something to kind of organize and gave them something to look for. I was surprised that the group I was working with honestly had no idea that all this information was in the book." I asked her why the students had a hard time finding answers in the science book. She replied, "We usually read it or go over it together and now it was their responsibility to find that information." She continued to explain that "they [the students] just have to learn they are not reading for entertainment. They

are reading to get some information. I don't think they have ever been trained to read like this or to look for answers." When I expressed my concern she felt obligated to use the matrix I gave her, she said the matrix closely resembled one in the textbook so, "You were right on track." She stated that there wasn't another organizer that she would have used. Becky also explained she had used organizers in the past. "It was daily but it was a very small graphic organizer. Maybe the main idea of what we read. Maybe just two questions." For a second time in the study, Becky's expressed her perception of graphic organizers being one main idea and two questions; her perception suggests she does not regard graphic organizers as spatial representations of textbook content and is a plausible explanation for her reluctance to create organizers that align with the lesson's rhetorical structure.

- Assessment: Becky stated she reviews the content with her students after two or three lessons by asking the multiple choice questions found at the end of the chapter. (I found the science textbook had one or two multiple choice questions at the end of each lesson.) She explained her students "hate the thinking ones, the application ones."
- Strong points of lesson*:* She felt the strong point of this lesson was "Kind of making them [the students] responsible for some of their learning." The organizer was "interesting and gave them some 'buy in' to that. So, I guess just letting them be responsible."

- Weak points of lesson: She said that she “missed the boat in not telling some of them, ‘Guys’---and I modeled the first one for them and I thought they were following along and knew the book was the source of all information here. But maybe the chart (pocket chart) had information and they thought it was all from there. I guess I need to clarify.” I asked Becky what she would do the next time she used a matrix for a science lesson. She replied, “I’ll still model it. I guess I’ll remind them – ‘Guys, where do you find all of these answers?’ Or ask them, ‘Where do you think we’re going to find all this stuff?’ ”

Chapter two - lesson two. Becky invited me to observe the subsequent science lesson three school days after lesson one in chapter two was completed.

Hands-on activities. Becky began the lesson with a hands-on activity. The students created a backbone using a pipe cleaner, Cheerios for the vertebrate and gummy rings for discs. After the students made their backbones, Becky provided direct instruction about the structure and purpose of the backbone and demonstrated how the discs aided flexibility to the backbone.

Technical vocabulary terms. Next**,** Becky focused on the vocabulary terms for the lesson. She utilized the pocket chart and the commercially-made vocabulary cards and definitions. She asked the students to take turns reading the definitions for the terms.

Graphic organizers. Becky read the first page of the lesson aloud to the students. Then she distributed six Venn diagrams and stated, “Venn diagrams help us to say how things are alike and different. We are going to look to find the information.” Becky skipped reading the second page of the lesson containing information about the three classes of fish. After reading the first two paragraphs of the third page, she modeled how to compare/contrast cartilaginous fish and jawless fish even though the text containing this information had not been read. She directed the students to read the rest of the lesson (2 ½ pages) and complete the six Venn diagrams by comparing/contrasting: bony fish to cartilaginous fish, amphibians to reptiles, mammals to reptiles, amphibians to birds, birds to mammals, and mammals to fish. She did not clarify which animal characteristics she wanted compared and contrasted.

On the second day, Becky guided her students in checking their Venn diagram homework assignment. She had six overhead transparences, each with a Venn diagram. The students supplied the answers for each of the six paired comparisons/contrasts as she wrote the answers on the overhead transparencies. Students were permitted to change and/or add to the answers on their Venn diagram. This follow-up was teacher-directed with the students supplying short answers and the teacher elaborating on the similarities and differences of the animals being compared.

Lesson Reflection. I conducted a lesson reflection interview with Becky more than two weeks after the final science lesson. The second professional development workshop was conducted the week following Becky's final lesson; observations/interviews were not conducted during the week of the workshop. The interview was brief because it was combined with the second teacher- interview for the study. Becky's responses to the interview questions follow.

- Rhetorical structure: Becky stated that she had taught the rhetorical structure, compare and contrast. She indicated that her students had utilized Venn diagrams during guided reading groups so they were familiar with the process. She said graphic organizer utilization "makes them [the students] go back and reread and find accurate information that they could put in their Venn diagrams."

- Assessment**:** Becky reported the students had "…done a very good job on the vocabulary and on the end-of-lesson tests. We have a majority – 85% or better- are doing a good job with 85% or better accuracy than those that aren't."

Fifth Grade Lesson Observations

I observed Jody teach two complete science textbook lessons. My observations included three sessions in both sections A and B. The content and delivery of content was similar across both sections.

Chapter one - lesson two. Jody invited me to observe a science lesson 1 ½ weeks after the first professional development workshop. The textbook lesson was titled, *Classifying Life.*

Hands-on activities. The day prior to this lesson, Jody taught the concept of classification by engaging her students in an activity sorting noodles according size, shape and color. The students worked in groups and sorted the noodles. Then they changed groups and sorted the noodles using different characteristics. The students were directed to provide labels for their noodle groups. The end products were displayed on the classroom wall.

Jody prepared her students to read the textbook by reviewing the term *classifying* and the noodle classifying activity. During the discussion, Jody repeatedly used the terms *sort* and *group* when referring to classification. She compared the labels the students had utilized during their hands-on activity to the labels scientists use when classifying living things.

Technical vocabulary. Jody randomly called upon average to advanced readers to read sections from the first page of the lesson. After a student read from the text, Jody led a class discussion about the highlighted vocabulary term(s) found in the paragraph. The discussion included finding synonyms for the vocabulary terms, discussing the term's meaning within the context of the text and connecting the term(s) with the hands-on noodle sorting activity.

Textbook graphic organizer. During most of the lesson, the students were engaged in a discussion about the diagram on the second page of the text. The diagram uses photos to illustrate the scientific classification (kingdom, phylum, class, order, family, genus and species) of horses. The students used this diagram to respond to teacher-generated questions such as, "Is a horse more closely related to a dog or to a spider? Why?" Jody compared the scientific classification labels to the labels the students had used during their noodle sorting activity. She also provided an analogy of sorting clothes into groups; some belong in drawers, some in the closet, some on the floor, etc. This discussion also included an emphasis on two more highlighted vocabulary terms: *kingdom* and *species*. Jody forewarned her students they would be required to know the labels and their order for the scientific classification of animals.

Graphic organizer. Jody continued to call on students to read the next section of the lesson aloud. Next, Jody drew a Venn diagram on the white erase board; the students quickly identified the diagram and stated its purpose. Jody asked the students to identify ways plants and animals are the same and different. As the students named similarities and differences, Jody wrote their answers in the appropriate sections of the Venn diagram. During this activity, Jody continually redirected her students to the text to locate similarities and differences until the Venn diagram was completed.

Review. Jody reviewed the term *classification* and the similarities and differences between plants and animals. She redirected the students to their textbook to discover the names of the two main groups in the animal kingdom (vertebrates and invertebrates.) The students used the remaining class time to read the fourth page of the lesson with a partner. They did not have a graphic organizer on which to record what they learned while reading.

Review and graphic organizer. The next day, Jody questioned her students to review the content of the science lesson with them. The review included defining key vocabulary terms, identifying the scientific classification labels, and comparing and contrasting the characteristics of animals found in the two main groups in the animal kingdom. The students were called upon to read aloud the remaining pages of the textbook lesson. Afterwards, they collectively completed a teacher generated T chart to compare and contrast nonvascular and vascular plants. The students were provided with time to prepare for the end-of-lesson test by completing a teacher-made web organizer which, when completed, contained a hierarchical order of the core concepts of the lesson. Jody provided minimum instruction for completing the web organizer.

Lesson Refection. Jody completed a written lesson reflection two days after the final science lesson. Her responses to the reflection questions follow.

- Rhetorical structure: Jody identified *classification* as the rhetorical structure lesson she taught prior to the science textbook lesson. She said, "The concept was needed in order for the students to understand the lesson."
- Non-technical terms: Jody identified *classify* as the non-technical term she taught; it was defined during class discussion. Synonyms for the term were also identified during class discussion and the students demonstrated their vocabulary knowledge by stating who uses *classification* and how. She said, "Then the students used a hands-on activity to experience and discover classification methods."
- Graphic organizers: Jody identified the graphic organizer for this lesson as a "kind of T chart" which was completed while the students read the lesson. She selected the T chart because it was recommended in the teachers' edition of the science textbook. "My hope was that this chart would assist the students in understanding the difference between each kingdom." She explained the purpose for the teacher-generated web organizer was to aid students in selecting the "…highlights of the lesson and see how all the information was related."
- *Assessment*: Jody assessed students' science textbook reading comprehension by administering the lesson one test; she said the assessment was less work and was readily available.
- Strong points of lesson: Jody felt the strengths of her lesson included student understanding of the reading demonstrated through their completion of the graphic organizers; she felt their reading had purpose. She stated the students' first attempt to complete a T chart was frustrating even though she had modeled

how to complete it. "Students didn't seem to understand what they should put down." However, the second attempt in working with the T Chart was better; she felt that having more time to work on the chart the second day was a factor.

- Weak points of lesson: She wrote both science class sections received "as close to the same instruction as possible." (It is plausible she misunderstood the question or made an error in answering.)

Chapter One - Lesson Three. Jody began the science textbook lesson titled, *Plants,* with an oral review of the basic science concepts the students had learned to date. She then directed her students to skim the first page of the lesson and predict the next topic they would be studying. The term *plants* and *classify* were among the answers provided by the students. (The first heading in the text is: *How are plants classified?*)

Science text structure lesson and non-technical vocabulary. Jody informed her students that she had looked through the lesson and had found many things to compare and contrast. She asked her students to explain what it means to compare and contrast. Next, she asked the students to identify key words that signal two or more things are being contrasted. The students generated a list of contrast words which Jody wrote on the white erase board: *different, differ, unique, opposite, this or that, divided, unlike, but, or not like,* and *however.* When asked to name words that signal comparison, the students generated the following list of words: *same, exactly, exact, alike, both, common, similar,* and *also.*

Graphic organizer. Next, Jody provided each student with a matrix which the students would use to compare and contrast vascular with nonvascular plants and gymnosperms with angiosperms (see Figure 4.5), locating the information in their science textbook. Jody called on students to read the first three paragraphs of the lesson aloud after which she asked her class to identify the similarities and differences between vascular and nonvascular plants. She directed the students to write short answers in the matrix and informed them they could use words directly found in the textbook. The students struggled in isolating specific characteristics to compare and contrast. (For example, nonvascular plants are small and survive without a transport system and vascular plants are divided into seed plants and seedless plants.) Jody worked with the class, scaffolding the exercise through direct instruction and questioning which guided the students to compare and contrast characteristics in the same categories. The scaffolding was time consuming and when the class period was almost over; Jody directed the students to continue reading in their science text and to complete the compare/contrast matrix for gymnosperms and angiosperms as a homework assignment.

The Word	What is it? (Definition)	Differences	Similarities
Nonvascular Plants			
Vascular Plants			
Gymnosperms			
Angiosperms			

Figure 4.5. Comparison Matrix

The next day, Jody began the science lesson by asking the students to generate a collective list to identify the similarities and differences between gymnosperms and angiosperms. Then, she directed the students to assemble into groups of three to read the next 6 pages in the lesson and during reading, to find similarities and differences between aerial roots, fibrous roots, taproots, and prop roots. At this point in the lesson, an organizer was not provided for students to record what they had learned.

Graphic organizers. After the students read and took notes, Jody called them back to work as a class. She reviewed the content by asking them to identify the similarities and differences they had found among the four types of roots. During the class conversation, Jody discovered the students had recorded facts about the roots but had not actually compared and contrasted their characteristics. After the discussion, Jody provided the students with a matrix to compare and contrast the four types of roots (see Figure 4.6).

The Word	What is it? (Definition)	Differences	Similarities
Aerial Roots			
Fibrous Roots			
Taproots			
Prop Roots			

Figure 4.6. Comparison Matrix for Types of Roots

Another organizer was on the back side of the paper, titled, *Comparison Grid,* but instead of providing boxes to write similarities and differences, the four boxes were titled, *Definition*, *Fact, Fact*, *Fact,* for the following topics: soft stems, woody stems, xylem, and phloem (see Figure 4.7). The students were directed to use this organizer as they read the remaining pages in the lesson. Jody did not provide the students with an explanation why she gave them a different organizer for the last pages of the lesson.

The Word	What is it? (definition)	Fact	Fact	Fact
Soft Stems				
Woody Stems				
Xylem				
Phloem				

*Figure 4.7.*Comparison Grid

Jody reviewed the comparison matrices on the third day of the lesson. Each answer was discussed with detail and in great length. Next, average or better readers were called upon to read aloud about cellular respiration on the last textbook page of the lesson. After each student read, Jody questioned the students about the content and she added information to broaden and deepen their understanding of the topic. The end-of-lesson test was given the following day.

Lesson Reflection. I interviewed Jody the same day the final lesson was taught. Her responses to the interview questions follow.

- Rhetorical structure and non-technical terms: Jody stated she had taught compare/contrast to her fifth graders during the first day of science lesson three. This lesson included non-technical terms that signal compare/contrast. I asked Jody how she determined the rhetorical structure for this lesson, and she stated that she had looked through the lesson and it seems obvious that the text was comparing concepts.

- Graphic organizer: I asked Jody why she worked with the class collectively to complete the first part of the matrix. She answered, "I think modeling it makes it clear to the students. There is always [sic] those students who you can tell how to do something, and they will catch on right away. But then there are those students you have to show how to do something, and I believe that once we went through it I could get more of them to understand what it was I wanted them to do." I asked Jody why she did not use compare/contrast graphic organizer for the last half of the lesson. She stated that the text provided a limited amount of information about the specific topics which was not conducive to comparing and contrasting. She acknowledged the rhetorical structure changed mid-lesson so she changed the graphic organizer to match the text. She said the students did not have previous experiences in her classroom with finding facts in a text so some of them struggled with the new graphic organizer.
- Technical vocabulary terms: Jody stated, "We're still struggling with defining terms. They want to give me an example or they want to be able to write it right out of text. I always stress the use of the Glossary…" She explained that not all of the vocabulary terms she teaches with science lessons are the highlighted terms in the text. When I asked her how she selects key vocabulary terms for each lesson, she replied, "Normally I go through the quizzes and the chapter tests and I pick those things out of the quizzes and tests because that's what they are going to be tested on and that is something I want to stress."

- Rhetorical structure of science textbook**:** I asked Jody if the organization of the new science textbook facilitated student comprehension. (I was referring to the rhetorical structure, but I did not clarify my statement.) Jody responded that she did not like the organization of the text. She felt that some lessons contained topics that needed more information. By organization, Jody was referring to the content of the text. Her response informed me that I needed to clarify my questions concerning rhetorical structure in the future and also in the next workshop, I needed to provide the teachers with additional information and experiences with rhetorical structure.
- Strong points of lesson: Jody felt the use of the graphic organizers and the student debates during small group work were the strengths of her lesson.
- Weak points of lesson: Time constraints limited her lesson; there was not enough time to teach specific concepts such as *transpiration* for deep understanding.

Post-Second Workshop Observations

The second professional development workshop took place the eighth week of the study; it began with a discussion session.

Workshop Discussion. The teachers responded to prepared questions in the following categories.

***Strong points of science lessons*.** The teachers' comments were brief; no one described the degree of success they had experienced in the implementation of the newly learned instructional strategies. Collectively, they agreed the graphic organizers were successful. Jody stated specifically sorting, classifying and charting cooking noodles was beneficial in helping her students make connections when they classified animals. Melanie commented on teaching non-technical terms. She said teaching sequence words had been the best part of her lessons, “My kids love sequence words.” I asked the teachers to state what had not gone well since the first workshop. Becky commented that her students had difficulties with cause/effect.

Science textbook reading achievement. I asked the teachers for perceptions of their students’ science textbook reading achievement resulting from the newly implemented instructional strategies. Becky responded, “The book is difficult.” Jody stated she was not pleased with the organization of the book. She noted that her students had performed poorly on a recent 5th grade science test. The participants appeared to be hesitant in commenting on their lessons while they were in a group setting. Two of the participants briefly commented on the readability of the text. Becky stated her students had difficulty with cause and effect, a rhetorical structure I did not observe her teach. Melanie’s science lessons had included specific, detailed instruction in the appropriate rhetorical structure and non-technical terms, but she did not describe the degree of success she believed she had achieved by implementing the strategies. The participants’ brief comments in response to my questions may have been a result of a discomfort they felt in providing the positive and negative aspects of their science lessons in the presence of peers.

Modes of science content delivery. I probed the teachers to discover the modes for delivering science content they considered effective. Collectively, they named, in the following order: (a) hands-on, (b) singing songs, (c) demonstrations, (d) computer demonstrations, (e) videos, (f) leveled readers books, and (g) drawing pictures and diagrams. The purpose of my question was to discover the degree of importance the participants considered textbook reading as a means for science content delivery. It is plausible the participants did not name textbook reading because they made the assumption I was asking for content delivery modes outside of textbook reading or simply because they did not consider textbook reading as a means for delivering content. Further probes were made during subsequent interviews to clarify these responses.

Workshop content. I wrote an informational article titled *Gemstones* to model instructional strategies for the compare/contrast rhetorical structure. Workshop instruction included a matrix with specific categories to compare and contrast concepts (see Figure 4.8). I also modeled instructional strategies that facilitate deep processing of vocabulary terms, specifically *Possible Sentences* (Stahl & Kapinus, 1991) and vocabulary concept cards (Moje, 1996).

Type	Mineral Composition	Hardness	Color	Natural Occurrence	Practical Uses
Sapphire					
Ruby					
Emerald					

*Figure 4.8.*Gemstones

I used *Gemstones* to show examples of “inconsiderate text” or text that lacks structure, coherence and unity which limits children’s reading comprehension (Alvermann & Boothby, 1983). The primary research-based instructional strategy to aide young readers to decide which information is relevant or irrelevant is the visual display of the text's key concepts in an organizer that aligns with the rhetorical structure (Alvermann & Boothby, 1983). Research-based evidence suggests graphic organizers are most effective for reader-recall of the text when they are constructed after the text has been read and when the teacher gradually releases control of this task to the students (Berkowitz, 1986; Merkley and Jefferies, 2000; Moore and Readence, 1984).

My post-second workshop observations were to discover the quality and quantity of the instructional strategies the teachers incorporated in their science lessons: (a) instruction in rhetorical structure and non-technical terms, (b) strategies to help student deeply process technical vocabulary, and (c) graphic organizer generation after textbook reading with the teacher gradually releasing control of organizer completion to the students. I was also interested in observing the configurations for science textbook reading. I observed the teachers for a four-week period between the first and second professional development workshops.

Third Grade Lesson Observations

I observed Melanie teach one complete science textbook lesson. I observed her instruct three sessions of section A and B. The content and delivery of the science lesson was somewhat different between the two sections; section B missed almost one instructional period because they attended a special program and consequently were behind schedule. The differences are described in the data collection results that follow.

Chapter Four - Lesson One. The textbook lesson, *Living Things Change Their Environment* was taught two weeks after the second professional development workshop. Melanie determined the lesson is written with cause/effect rhetorical structure.

Technical vocabulary. Melanie began the science lesson by introducing three vocabulary terms written on the white erase board: *resource, competition, pollution.* She directed her students to read the words "in their heads" and then to work with their partner to develop sentences that use the words. She read the first word aloud and instructed her students to "come up with a sentence that used the term *resource*.

After the students worked with their partners to generate sentences, Melanie redirected the students' attention for a whole-class discussion about the meanings of three vocabulary terms. As examples of *Possible Sentences* were presented and discussed, Melanie wrote them on the board.

Examples of student-generated sentences follow:

1. We use a resource.
2. A resource is something like water or paper.
3. Competition is somebody you go against and try your hardest.
4. Competition makes something hard for you.
5. Pollution is when water gets trashed.
6. Pollution hurts the world.

Text structure mini-lesson; non-technical terms. Melanie asked her students to guess why they were creating sentences with the vocabulary terms, "What have we been doing with other vocabulary words, so far?" One of the students noticed a new word chart on posted on the wall with the heading, *Cause and Effect* and asked if the new terms were related to this heading. Melanie explained they had learned sequencing and main idea/details in science and they now were going to learn cause/effect. She continued by giving examples of cause/effect. “I was really thirsty **so** I took a drink of water.” Melanie then took a playground ball and bounced it on the floor. She said, “Dribbling a ball **causes** it to bounce.” She presented another demonstration by showing the class a brand new pencil saying, “I cannot write with my new pencil.” (She sharpened the pencil.) “Now the pencil has a sharp point and I can write with it.”

Melanie solicited examples of cause/effect from the students. She asked the students to complete the following statement: “I slept-in this morning so____________.” The students completed the sentence with: (a) I was late for school. (b) I rushed. (c) I missed breakfast. Melanie reversed the process and informed the students she was going to give them an effect and they needed to generate a reason it happened. She stated sometimes cause and effect can be “backwards.” She provided the example, “I was muddy **because** Franklin kicked mud all over me.” A student provided the example, “I was muddy because I jumped in a puddle.” She concluded the cause/effect lesson by presented the terms, *because* and *if* as terms that signal cause and *then* and *so* as terms that signals effect; theses terms were written on the *Cause and Effect* chart.

Technical vocabulary. Melanie directed her students to open their science books to the first page of the lesson; she read the vocabulary terms aloud and reviewed the meaning of the prefix “re” and asked her students to apply this knowledge to determine the meaning of *recycle*.

Science lesson text structure. Melanie informed her students they were going to read *cause and effect.* She called on students to read the text aloud. During the reading, Melanie questioned the students. For example, she asked, “A spider spins a web because________. A bird builds a nest because______. A plant takes in water because_________.” After the last statement she cautioned the students they might have to make an inference to answer it. (The textbook does not provide an effect. Students had to infer plants take in water to live or survive.)

Possible sentences and non-technical terms. When the students read the paragraph containing the term *resource,* Melanie directed the students back to their *Possible Sentences*. The students compared their *Possible Sentences* with the sentence from the text and discovered one of their *Possible Sentences* was similar.

The students encountered a graphic organizer in the text. Melanie explained the graphic organizer showed sequence and she helped the students analyze its structure and purpose. The vocabulary term *competition* was in the last paragraph the students read. Melanie pointed out the *Possible Sentences* describe humans competing; in this science lesson, competition refers to plants competing for resources. She also directed the students’ attention to the cause and effect relationship in the same sentence, refining it by substituting the term *because* for *as a result of.*

Section B received only 10 minutes of science instruction due to a special Veteran’s Day program. They had time to develop *Possible Sentences* for the three vocabulary terms. Examples of these sentences follow:

1. Resource is what you use.
2. Trees are resources.
3. There is a baseball competition this Sunday.
4. Michael Phelps was in a world competition.
5. Pollution is not good for the Earth.
6. Pollution is when garbage is on the ground.

The science lesson ended after the students developed the *Possible Sentences.*

Non-technical vocabulary. The second day for Section A began with a review of the terms written on the cause/effect wall chart. During the discussion, terms were added to the chart; *because*, *if,* and *by* were listed under “cause” and *as a result*, *then,* and *so* were listed under “effect.

Science lesson text structure. The students read the lesson in unison. During the reading, Melanie probed the students to find examples of cause and effect in both the text and in the illustrations. She directed them to discuss the term, *pollution* when they encountered it in the text and encouraged them to connect the reading to prior knowledge about pollution. During the reading she also directed her students to turn to their partner and verbally identify the cause and effect in the material they had just read. As the students, worked with their partner, Melanie circulated around the room and listened to their conversations. I observed some students responding 2 to 3 times in her presence before they could identify the correct effect.

Technical vocabulary. The students were directed to develop a concept card (see Figure 4.9) for each of the three primary vocabulary terms for homework. The concept cards are similar to the ones I presented in the second workshop. One piece of paper is folded into four sections and is used for each term.

Front

Vocabulary Term

Back

Definition	Use the term in a sentence
Synonym for the term	Illustration for the term

*Figure 4.9.*Vocabulary Concept Card

Technical and non-technical terms. The students in Section B read the science lesson on the second day of instruction. Melanie called upon the students to read the text aloud, paragraph by paragraph. The instruction in Section B somewhat differed from Section A during the oral reading. Melanie stopped the students during reading to identify sequence words, directing the students to utilize their sequence word wall chart as a resource. Also, Melanie encouraged the students to connect their prior knowledge of *resource* learned social studies to the meaning of the same term used in science.

Technical/ non-technical vocabulary and graphic organizer. On the third day of the lesson for section A, Melanie checked the vocabulary concept card homework by reviewing the terms and their meanings. Afterwards, she distributed a cause/effect chart (see Figure 4.10). (Earlier, Melanie informed me she was having a difficult time finding a graphic organizer that aligned with structure of this particular chapter. I created a chart as an example and Melanie decided to utilize it in the classroom.) The chart has eleven incomplete cause/effect relationships found in the science lesson; five sentences have the *effect* portion missing and six have the *cause* portion missing. The chart also includes spaces for the students to define the terms *reduce, reuse,* and *recycle.* Melanie provided guided her students as they completed the chart; she directed the students to read a specific paragraph in the text to locate answers. When students demonstrated difficulty in identifying the cause/effect relationship in the paragraph, Melanie read the specific sentence that contained the answer. She scaffolded the completion of the chart for the first three items. For the third item on the chart, Melanie forewarned her students they might need to make an inference; this particular inference had been discussed earlier on the first day of the lesson. She encouraged them to refer to the cause/effect wall chart which lists the non-technical terms that signal cause/effect.

During the scaffolded instruction, one student suggested the word "to" was a cause/effect term, using the example," A spider spins a web to catch insects for food." Melanie explained the word "to" can mean so many things, she was not going to put it on the *Cause and Effect* chart but she understood why the student made this comment. Then students were directed to complete the rest of the chart independently, utilizing their textbooks and/or making inferences. During this work time, Melanie circulated around the room, giving assistance to those students who needed help completing the chart.

Harmful materials get into the air, land or water **causes**	
Draining wetlands is harmful **because**	
Because people cut down trees	
The kudzu plants are harmful **because**	
When new organisms are not eaten by many animals they reproduce very quickly. This **causes**	
Trees are helpful to the environment **because** (name 3 things.)	

(back)

Cause	**Effect**
Because a spider spins a web	
Because a bird builds a nest	
Because a plant takes in water from the soil	
Because bacteria, worms and fungi break down leaves and other dead material.	
Because every environment has a limited amount of *resources*	
Competition can **cause**	

Reduce means:____

Reuse means:____

Recycle means:____

Figure 4.10. Living Things Change Their Environment

By the third day of the lesson, section B still had not progressed as far as section A. Melanie began this lesson by providing the students with the meaning for the prefix “re” and asking the students to utilize this information to define *reduce, reuse,* and *recycle.* The class finished reading the text with the teacher and selected students alternating in reading aloud. Next, Melanie presented the students with the chart and scaffolded instruction in a similar manner as with section A. As the students completed the chart independently, Melanie continuously redirected the students to the text to find the answers.

The chart appeared to be a difficult task for both sections; Melanie redirected the students to their textbooks often, directing them to the specific passage to read and modeling the steps to locate a cause or an effect relationship. I noticed while cause/effect was the prominent rhetorical structure for this science textbook lesson; other structures, such as sequencing and main idea/detail were also present. Melanie did direct her students’ to examine and discuss the structure of the text written with a sequence structure.

Lesson Reflection Interview. I interviewed Melanie one day after the final science lesson had been taught. Her responses to the interview questions follow.

- Rhetorical structure: Melanie explained this was the first time she had formally taught cause and effect in connection with nonfiction text. When I asked Melanie to explain the degree of difficulty in teaching cause and effect, she said, “I don’t think it was terribly difficult. You gave me some good suggestions. It was nice to start with some real world things they could see or imagine before reading the text. That, I think, eased them into it a little bit and having the poster up helped put some of those words down. But reading the science book was still tough. The cause and effect from the science book was still really tough to pick out for them." (The suggestion Melanie referred to were ones I had given to the teacher-participants collectively during the second workshop.)

- Non-technical vocabulary: Melanie felt the science lesson was difficult for the students to read even though they had been introduced to the rhetorical structure. "We went over the text kind of as a whole group just because I anticipated that it would not be easy for them to pick it out by themselves at first. We even discussed it in that context of what's happening and what's happening as a result. I even used some of the words that were supposed to be signal words. Sometimes they are in the book and sometimes they are not. A lot of them they had to infer which is not always the easiest. They are looking for those signal words every time and they are not always there, so that made it difficult." Melanie explained the non-technical word, *because,* was the "big one" since it contains the term *cause.*
- Technical vocabulary**:** Melanie stated the students did a nice job in developing *Possible Sentences* for the three terms which she considered to "not necessarily be the easiest." The students had been exposed to *resource* and *pollution* in Social Studies and she stated "it was nice to make that cross-curriculum connection." Melanie explained the students had previously developed vocabulary concept cards so "…they kind of knew the routine already."
- Graphic organizers: Melanie had to redirect her students to the text when they were completing the organizer. The amount of help needed varied among the

students; the difficulty was they had to infer some cause/effect relationships because the direct answers were not in the book. She explained if the information the students were seeking was not on a certain page, they not know to turn the page and continue their search. (For example, the heading ***Pollution*** might be on page 152 and the information under this heading continues on to the next page.) She felt providing page numbers and identifying specific paragraphs facilitated the students' completion of the chart. She said that when the students were looking for cause and effect in the text, they were discovering relationships between concepts in the text; the relationships, however, were not always cause and effect.

- Strong points of lesson: Melanie felt her lesson was a solid introduction to the rhetorical structure, *cause and effect.* She stated that with repeated practice, the task of locating cause and effect would become an easier task for her students. She continued, "I really like the idea of reading the text first and then the graphic organizer. That was the change I loved." When I asked her why she likes graphic organizer construction at the end of the lesson, she replied she thought the students focused more comprehension while reading the text and when they worked on the organizer, the students could focus on the structure of the text and "…go back and really get the details and sift through that information." Overall, Melanie felt the graphic organizer activity facilitated the students' comprehension of the science textbook lesson.

- Weak points of lesson**:** Melanie stated that it took a long time to teach the lesson – a whole week. However, she felt it was a well-structured lesson and acknowledged the introduction of new concept takes time. Melanie stated when she teaches this rhetorical structure next time, she will teach it in a similar manner but she will remove the some guided instruction to encourage student independence in locating cause and effect relationships in the text.

Fourth Grade Lesson Observations

I observed Becky teach one complete science textbook lesson. The week following the professional development workshops, Becky did not communicate with me that she was ready for me to observe a lesson. I asked her at the beginning of the second if I could observe a science lesson the following week. She notified me that she was attending a workshop three days that week. After the beginning of the third week after the workshop, I asked Becky again if I could observe her science lesson and she agreed.

Chapter Three - Lesson One. The lesson is titled *Introduction to Ecosystems.*

Technical vocabulary. Becky gave each student a piece of paper and instructed them to fold it lengthwise and make a cut every two inches to create squares that could be folded back. Then, she gave each student a list of vocabulary terms from this science textbook lesson. Becky directed her students to write one vocabulary term on each pre-cut square, fold the square back and underneath write “what you think the word mean”. She told her students to “just make a guess. The first word is *biotic factor*. Here’s a hint; bio reminds me of a subject I took in school. Let’s make a connection. Remember this morning we were talking about prefix and suffixes. Think of bio as a prefix.” She continued to name each of the vocabulary words and asked the students to tell a meaning orally. The students were permitted to write answers on their papers during this discussion.

Pre-reading activity. Becky informed the class they were going to work on a KWL chart together. The chart was on the back of the paper where the vocabulary terms were listed. She instructed her students to write "Ecosystems" on the top of their charts. Then she gave them five minutes to write everything they knew about ecosystems under the "K" (What I Know) heading. After the allotted writing time, the teacher and students discussed what they knew about ecosystems and then collectively decided what they wanted to find out. Students individually wrote responses under the "W" heading (What I Want to Find Out) on their papers during this discussion.

Technical vocabulary instruction. After the students had completed the first two headings in their KWL chart, Becky directed them to open their science books to the first page of the lesson. She read the title and the first two paragraphs of the lesson aloud which contained the definition for *biotic factor.* Becky showed the students a commercially-made vocabulary card with a picture on one side and the definition of *biotic factor* on the other. Becky read the definition to the students and asked them to identify items in the room that are biotic factors. Next, she asked the students to collectively say, *biotic factor.* She called on a student to read the next paragraph in which the term, *abiotic factor* was defined. Next, the students were required to identify one thing in the classroom ecosystem that is an abiotic factor. After each student provided an answer, Becky repeated the definitions of *biotic* and *abiotic* factors.

Becky continued to call on students to read the rest of the chapter aloud. When a student read a paragraph that contained one of the vocabulary terms, Becky would show the relevant commercially-made vocabulary card, read the definition, ask the students to say the word in unison after which she would place the vocabulary card in the pocket chart located in the back of the room. After the lesson had been read, Becky pointed to each vocabulary term in the pocket chart, one at a time, and asked the students to collectively read each term aloud. For the closing activity, Becky utilized the Smart Board to engage the students in a fill-in-the blank vocabulary activity from the textbook website.

Becky began the second day of the lesson by asking the review questions found at the end of the lesson. After the review, the students were given a piece of paper and were directed to draw an ecosystem and be prepared to explain the biotic and abiotic factors. After the students completed their drawings, they came to the front of the classroom, one by one, and shared their drawings with the class. Becky required the students to specifically identify the biotic and abiotic factors in their ecosystems.

Next, Becky reviewed the vocabulary terms by utilizing the cards in the pocket chart. She named the term and then called on individual students to read the definition. After the review, she directed the students to take out a piece of paper, write the vocabulary words in list form and then write a definition for each word or provide examples of what each word means. She said, “Show me what you know. You will need to write six sentences.” After the students asked several questions, she stated, “Another way would be show me what it means by using it in a sentence. After a ten minute time period, Becky picked up the students' papers and informed them about a hands-on activity they would begin the next day.

Lesson Reflection Interview. I scheduled a lesson reflection interview with Becky after school. When I came to Becky's room for the interview, she was working with students. She apologized and explained that she had forgotten about the interview. I successfully scheduled a lesson reflection interview 5 days after the final lesson. Her responses to the reflection questions follow.

- Oral textbook reading: I asked Becky why she or selected students read most of the science text aloud. She said that she could guarantee me that if she asked her students to read two or three pages of the science textbook silently, not every student would read it. She continued to explain some of the students that did read it would "have no understanding and we just need to read it and discuss it together for their knowledge. We just have to." I asked her if she meant that not all fourth graders had the ability to read the science text. She answered, "Some of them are still working on how to read and comprehend. I mean, they can read a whole page and not [have] a clue about what they read. Some of them have the strategy – read it and if I can't remember it, I go back and reread it. So, to reach everybody, we read it together."
- Rhetorical structure: Becky did not identify or teach the rhetorical structure of the science textbook lesson. She said, "This one, I don't think was pointed in any one direction. There were a lot of ways to go with it."

- Graphic organizer**:** Becky stated she did not use a graphic organizer for this lesson. She indicated the vocabulary "foldable" the students created was a type of organizer. When I asked her why she classified it as an organizer, she replied, "The kids see the word; they open the flap up and they see an example, a picture, a definition. They can kind of self-test themselves with definitions. They can self-check themselves with examples." Becky felt the "foldable" activity was successful. "They used a lot terms that were unusual. That was using the words on the chart and using the computer things for the first time. They did a very good job when they had to apply their knowledge and write it out or use those words in a sentence that showed that they knew the meaning." It appears Becky measured the success of the vocabulary activity when the students constructed sentences using the new vocabulary terms.
- Strong points of the lesson**:** Becky stated the lesson was successful because, "They are not panicked now when they see unfamiliar vocabulary now. I think just because of the vocabulary cards. We talked about it two or three different ways. They love moving around on the computer. I just wish we had laptops so everybody could do that. They drew and they wrote to explain before I assessed them."
- Weak points of lesson**:** I asked Becky to explain what didn't go well in the lesson or to identify anything she would change the next time she teaches it. She replied, "There was another piece on the technology that was journaling, and we just

didn't have time to go through all that part. I just simplified it. I just have to be more familiar with the pieces that come with this program."

Fifth Grade Lesson Observations

I observed Jody teach part of a lesson and one complete science lesson. Specifically, I observed her teach one session for section A and four sessions for section B. Past observations verify the content and delivery are very similar between section A and section B.

Chapter One - Lesson Five. The title for lesson five is *Animal Systems.*

Technical vocabulary. Jody began the science class by giving the students the L to J science vocabulary test. Afterwards, she directed her students to open their science books and to read the lesson's main idea printed in the text and then asked them to tell the main idea of the chapter in their own words. She called upon three students before an appropriate response was given. She prompted them by asking what the term *response* means. A student answered, "When you ask me a question, I respond." Jody connected this answer to the text by saying, "Part of the main idea of this chapter is how the body responds to the outside world. Respond in the lesson's main idea means *reacts*."

Jody began explicit vocabulary instruction by asking the students to read the terms listed in the text, one by one, and use them in a sentence. As the students stated their sentences, Jody wrote them on the white erase board. Examples of the student-generated sentences with the underlined vocabulary words follow:

1. We use our <u>skeletal system</u> to move.
2. The <u>muscular system</u> works with your skeletal system.

3. The process of food being broke down is called the digestive system.

4. The excretory system removes gas and wastes from your body.

These sentences were similar to sentences in the science textbook.

Configurations for science textbook reading. Next, the students were directed to read the text. The first was a voluntary reader; the rest were selected by the teacher to read. As the text was read, Jody discussed the content with her students by questioning them. At one point, she directed the students to hold out their arms and move them at the elbow joint to demonstrate how the muscular and skeletal system works together. The students read and discussed the critical thinking question on the second page of the lesson. The lesson ended with Jody giving her students commercially-made vocabulary worksheets; the content of the worksheet was an exercise requiring the students to match vocabulary terms with the appropriate definition.

The procedure and content of instruction in section B aligned with section A. The sentences this class generated are as follows:

1. The skeletal system is made up of bones, tendons and ligaments.
2. The muscular system helps you move.
3. The digestive system has a long tube that breaks down food.
4. The excretory system removes waste from your body.

As with section A, the structure and content of these sentences closely follow sentences in the science textbook which suggests the students were using the textbook as a resource when they answered.

Lesson reflection interview. I interviewed Jody a week after the final day of instruction for chapter one, lesson five. Her responses to the interview questions follow.

- Rhetorical structure: Jody stated when she plans a lesson she does not determine the rhetorical structure of the text but decides how she is going to deliver the content to facilitate student learning. “I don’t always sit down and go, ‘Well, what is the rhetorical learning here?’ I don’t always go, ‘How are they writing this?’ I more often go, ‘How I am going to teach this in terms of getting those facts to the students so they know how they are associated with each other?’ What are the main facts? What are the main things they need to know out of this lesson: Not so much how the lesson is written as to how can I teach the main concepts?” Jody could not identify the way the text in this lesson was organized. However, she thought main idea/detail fit the content of the text.
- Graphic organizers: Jody described the graphic organizers and the reasons she selected them for this lesson. The lesson focused on describing body systems. Jody stated, “It basically starts with the concept of this is the lesson and then within the lesson, we divide off into different systems for the body and from the body systems I divided off----it was more like a web-type of graphic organizer where we divide them off into the details that I wanted them to know about each system. I just used a word or key word or a couple of words so students could then go on and it would trip an idea or a concept about that fact or about the system.” She said that the materials “just sort of fell into that type [web] graphic organizer.” Jody liked the web organizer because it does not require detailed

information and it branches off so the students can visualize the connections among the ideas. Each student had an organizer and completed it as the class collectively provided the answers. Jody wrote the answers on an organizer displayed on the overhead projector. The students could use their textbooks to complete the organizers; if they struggled in finding an answer for the organizer, Jody redirected them to the textbook. Jody felt the graphic organizer completion was a successful activity.

I asked Jody if a graphic organizer should align with the way the text is written. She responded, “I don’t know if it’s so much the way the text is written, but more importantly, the information that is taken from the text. I don’t know. I see a difference between the way it’s written and then how the information falls.” She said that the goal of using an organizer is to visually organize the material from the text into meaningful units that the students understand. She believes organizers can serve a study guide and they aide in recall of important information. Jody stated she believed organizers were the most effective when completed after the text had been read.

- Nontechnical vocabulary: Jody stated she did not teach non-technical vocabulary with this lesson.
- Technical vocabulary: Jody described the *Possible Sentences* vocabulary lesson where the students used the terms in a sentence and then after reading the text, returned to the sentences, decided if they were accurate or not, and then corrected the inaccurate sentences. Jody stated the students had read this particular lesson

earlier in the year so they should have been familiar with the vocabulary terms. *Possible Sentences* served as a review of the terms. She said some students struggle with *Possible Sentences* because they want to define the term instead of use it in a sentence.

- Assessment: Jody believed there was little, if any, relationship between the graphic organizer activity and the results of the end-of-lesson quiz. She believed her students learned more content than the quiz assessed. “However, I would like to think that learning the lesson – there is a lot more there than those 5 questions that would appear on the quiz.
- Strong points of lesson: Jody felt the student enjoyed the lesson. They content they learned extended beyond what was written in the text.
- Weak points of lesson: Jody thought the material in the text was too difficult for some her students and she needs to find a way to simplify the concepts.

Chapter two – lesson one. This lesson is titled, *Reproduction.*

Science lesson text structure and non-technical vocabulary. Jody asked her students to identify the reading skill provided on the first page of the textbook lesson. After a student identified the skill as *sequence*, Jody asked her students what it meant. One student answered, “in order.” Jody reminded her students of a previous sequencing activity and asked them to generate a list of sequence words. She guided her students in generating the following list: first, next, last, beginning, middle, end, second, third, later, middle finish, now and finally. Jody then directed her students to look for sequencing as they read the textbook lesson.

Technical vocabulary. Jody concluded the lesson by asking the students to use each vocabulary term in a sentence. Examples of these sentences with the terms underlined follow:

1. <u>Sexual reproduction</u> is when something comes from two parents.
2. <u>Fertilization</u> is where parent fertilizes the babies of the other parent.
3. <u>Asexual reproduction</u> is the making of an organism from only one parent.

Jody explained she was not stating whether the student-generated sentences were right or wrong. The students had their science books open while they were generating sentences even though Jody had directed them to close their books. Some of these sentences closely resembled the sentences found in the text which suggests the students were using the text as resource during this activity.

Configurations for science textbook reading. Jody directed her students to open their science books to the first page of the lesson and she called upon students to read the first two pages aloud. After each paragraph was read, Jody discussed the content with her students.

Graphic organizers. During the lesson, Jody used her hands and arms to simulate a graphic organizer saying, "Underneath would be two types of reproduction, sexual and asexual." Next, she drew a simple diagram on the white erase board and labeled it to show the steps of sexual reproduction. At the conclusion of the lesson, Jody wrote the heading "Sequencing" and the terms, "first," "next," and "last" on the white erase board. The class collectively helped Jody develop the following sentences:

First: the male sperm and the female egg join together in a process called fertilization.

Next: a zygote is made that contains genetic traits from both parents.

Last: the zygote multiples and develops a new and individual offspring.

Technical vocabulary. The students revised the sentences they wrote for each vocabulary term on the second day of the lesson. After each sentence was read, Jody surveyed her students to discover if they agreed or disagreed if the vocabulary term was using correctly. If the majority of the students disagreed, the class discussed the meaning of the term and revised the sentence accordingly. Examples of sentence changes follow:

1. "Sexual reproduction is when something comes from two parents" was changed to "Sexual reproduction is the making of babies from two parents."
2. "Asexual reproduction only comes from one parent" was changed to "Asexual reproduction is the making of an organism from only parent."

Configurations for science textbook reading and graphic organizer. Jody reviewed the content of the text read the previous day. Then, she called upon students to read the rest of the lesson aloud. After each paragraph was read, Jody questioned her students to check comprehension and to clarify misunderstandings. She also provided additional information through direct instruction. At one point, she drew a diagram on the white erase board to illustrate the concept of splitting (one type of asexual reproduction).

At the conclusion of the lesson, Jody asked her students to answer the "quick check" question at the end of the lesson. She guided their answers by providing logical thinking steps. She distributed the homework assignment which was an incomplete, commercially-made outline of the chapter; vocabulary terms were included.

The L to J science vocabulary test was administered on the third day of the lesson. Afterwards, Jody informed her students the test over lesson one would be given in two days and would differ from the former end-of-lesson tests; it will include five questions about the vocabulary terms. She stated the purpose of this day's lesson was to review for the test. The students reread the chapter, round-robin style and Jody asked questions about key concepts and terms.

Graphic organizer. Next, Jody asked her students, "Okay, what is this whole lesson about?" She drew a web organizer on the white erase board and provided direct instruction as the students helped her complete it. The web organizer was a summary of the important concepts in the chapter (see Figure 4.11).

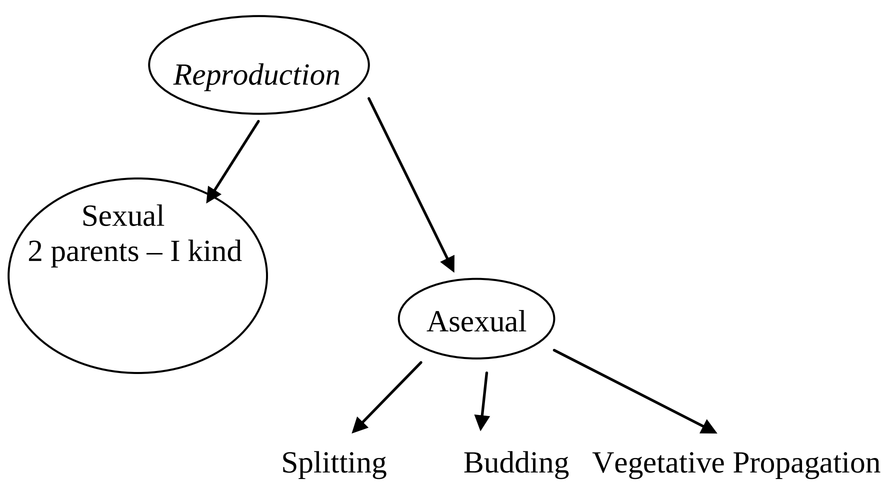


Figure 4.11. Web Organizer

Lesson Reflection Interview. I interviewed Jody four days after the final science lesson. Her responses to the reflection questions follow.

- Oral textbook reading**:** I asked Jody to explain why her students read the science textbook aloud. She said the textbook was read orally because it provided her the opportunity to clarify difficult concepts before any misconceptions were formed and she wanted to be certain her students read all the words in the text.
- Rhetorical structure: Jody stated the rhetorical structure of the lesson as sequencing. She reviewed the concept of sequencing along with the appropriate non-technical terms at the beginning of the lesson. She felt the text did not utilize the non-technical terms well. "One of the problems was that even though the lesson was supposed to be sequencing, sometimes the book would give you the first step and the last step but skip the middle step. So, I had to improvise that by adding a step in."
- Graphic organizers: Jody used a graphic organizer showing the order of key concepts (i.e., first, next and last) and the organizer was used as a chapter review. She described her students' success in understanding and recalling the science lesson as being a result of

  teaching sequence and using the graphic organizer. "I believe this was one of the better rhetorical structure-kind of units for---it doesn't always work out so well – but this one had the right kind of information – enough information – that you could actually use that organizer or that structure." When I asked Jody how she determined the text and the organizer were a good match, she described the lesson review during which the students collectively completed the organizer with success. During the interview, Jody did not refer to the web organizer she used as a review at the end of the last science lesson.

I asked Jody if she was aware that she had utilized a type of graphic organizer when she used her arms to indicate there are two types of reproduction and that the organizer varied from the rhetorical structure she introduced at the beginning of the lesson. She replied, "Yeah. That's the way – I like it so students see where things fall. When we do that branching off kind of like a web kind of thing, it seems that the students can see 'this falls into that'. I got the impression, just a feeling I got, as we were reading that they were getting confused especially between asexual and sexual reproduction. I just felt from maybe the questions that were being asked or the way students were answering questions – I don't know what keyed me in – but I really got the feeling they were not straight on that."

- Non-technical vocabulary instruction: Jody said her students were very familiar with sequencing; it was "something they have done since kindergarten when they did not use words but used pictures and numbers where they had to after a story was read." As a result, she asked the students to generate a list of sequencing non-technical terms based on their background knowledge. I asked if the sequencing words were in the text and she replied, "Not all of them. I do see the word 'first' here. Oh, 'then' is over here. Occasionally, you will find a word that indicates that something is being followed by something else." I pressed Jody to explain how her students were able to tell the sequence of specific events in the lesson if the text did not have the non-technical terms to help them. She said, "I think that it helped when I did it on the board the first time---I used it as a learning process." She explained that with scaffolding and modeling, the students were able to independently sequence events the second time they attempted the activity.

- Technical vocabulary instruction**:** Jody asked her students to collectively create two sentences for each term to give her an idea of what they thought each word meant. After they read the text, they returned to the sentences to see if they were correct. If the sentences weren't correct, she asked them "if they could fix them somehow or give an indication of why they were not accurate." I asked Jody to rate this vocabulary activity on a scale of 1 to 10 with 10 being the highest. She answered, "I would say more like a 3. It's not my favorite. Students are giving sentences and I've had kids question whether the sentences were right, especially when they had to go and use that information later. I've had kids come up and say, 'Are we supposed to go by the definition of the sentence that the kids came up with or do we go by what is in the book?' I'm afraid – I guess my thought is you're letting them believe a wrong definition." Jody identified her favorite vocabulary strategy. "We are using cards – it's quite simple. It's just learning the definition. I am staying away from….You had brought up a card that had different parts on the back. One of the parts was 'what it is not'. I don't think the students need to learn what it's not. I want them to learn what it is. I have them do cards for each vocab. word. I want the word on one side and I told them to write the definition on the other side. So they did that. But they haven't been through the lesson yet, remember that. So I had originally told them, 'put the definition up on top and down below on the back side, write a sentence.' But when a student came up and didn't quite understand what the definition was – what the word was. She said, 'Mrs. Powers (pseudonym), how am I going to write a sentence when I don't understand this word in the definition?' so I altered my assignment. I told the students right away. Wait until we go through the lesson and we talk about these words and we get a better idea of what the words mean. Then I'll have you go back and use them in a sentence. I have used these cards before with just the word and then the flip with just the definition and they have worked in other years so we'll see. I am pulling out of my bag of tricks here." I asked Jody if she was planning on working with the vocabulary in other ways beyond writing the word and definition. She stated that the students would be completing vocabulary worksheets and studying the vocabulary cards by reading the word and the definition, flipping the card over and trying to give the definition. "I told them to have someone read the definition and use them like flashcards."

- Assessment*:* Jody began altering the end-of-lesson quiz by adding a vocabulary section consisting of five vocabulary-definition matching tasks. I asked her why she made the decision to add vocabulary. She answered, "I added the vocabulary words which may make a more complete quiz, quite honestly. Originally I did it because I have some students that are struggling with this quiz and our grades are not doing so very good." When I asked Jody if adding the vocabulary helped improve the scores, she replied, "I think it did. Now, the point is they had to memorize those vocab words, but I still maintain vocab is a very important part of science. I wish I had thought of it right away – but I do believe that it added to the quiz rather than just – and I don't think it was just a method of making them pass. I think there was more to it than that. I don't think it watered down the quiz."

- Strong points of lesson**:** Jody liked the way she organized the lesson. "I always feel better if I can organize it in such a way to make it clear to the students. Not all lessons are that easily organized. I think the kids did better in their understanding of it."
- Weak points of lesson: Jody said that when she teaches the lesson next year, she would have actual plants in her room to help her demonstrate certain types of reproduction. She added, "Of course, the only other thing that didn't go well is they didn't all get 100 on the quiz which is my goal. Aim high, right?"

Mid-Point Interview

The purposes of the second interview were to discover the teachers' fidelity to the implementation of instructional strategies presented in the workshops, the relationship between the workshops and the teachers' beliefs and attitudes towards science textbook reading instruction and to ascertain why they have constructed these beliefs. I was also interested in discovering the teachers' perceptions of the effects of the newly implemented instructional strategies on their students' reading achievement.

I interviewed Melanie on November 4th and Jody on November 5th; Becky was interviewed on November 11th. The interviews were 6 and 7 weeks respectively after the first professional development workshop.

Rhetorical structure. I asked the teachers to describe the rhetorical structures they had been teaching since the first professional development workshop. Melanie identified sequence, main idea/detail and compare/contrast. When I asked her to describe the degree of success she has had in the implementation of the newly learned strategies, she replied, “I’ve learned a lot doing it and I think the kids have, too. It takes longer to get through things but I think sometimes [it’s] just the initial learning too, not only to do the rhetorical structure but the non-technical things. It does probably take - I don’t even know - double the time to do a lesson. But I do think they (the students) are getting a lot out of it, learning a lot from it and I would guess that the review – the times we have to review – would not take as much time.”

Becky explained, “We have worked on sequencing. We have worked on compare and contrast, Venn Diagrams, sequencing – I guess we just taught one on life cycles so the one I’m remembering now is the sequencing one – first this happened, then that happened, then that happened. They [the students] have drawn arrows to show that.” When I asked Becky to describe the degree of success she has had in teaching rhetorical structure, she replied, “Kind of funny. We do a lot of connections in reading and now I’m finding they make a lot of connections with the rhetorical structure they are using. They are making connections that work not only in reading and their non-fiction books but it’s also working in their science textbooks.” I probed Becky to describe how she has been measuring the degree of success of the connections the students were making. She answered, “A lot of times it’s just a quick review that we have to do with the structure before we start. Now, next year they have done it in third grade and in science and reading. I would just hope a brush-up review in science or reading would bring it all back to them."

Jody described the rhetorical structures she had taught. "I've used compare and contrast quite frequently. It seems to be a type of structure that the students can understand very well and it tends to go along with a lot of my lessons. Classifying was another one and so much depends upon what the lesson is. I kind of look ahead and I've got some sequence things coming up but this whole chapter has pretty much those two, I think." I asked her about the lesson she was currently teaching and she said that it was main idea/detail. When I asked her to describe the degree of success she has had in teaching compare/contrast and classification, she replied, "I think both of those have accomplished quite well. I think they do understand classification. We've done activities with them. I kind of feel that if I gave them some materials to classify they could go about doing it in a very simple manner. At least, they know what classifications is. When it comes to compare and contrast, it's pretty much the same thing. They know there is more than one way to look at it. They know what the two words mean."

Non-technical terms. I asked the teachers to describe the success they had with teaching the non-technical terms that aligned with the science textbook rhetorical structures. Melanie described the non-technical word charts she and her students constructed for each rhetorical structure they had studied. She replied, "I think one really successful thing for me in science, as we introduce them [the non-technical terms] was to put them in writing right away and post them because kids love to add to it. They love to look back at it and reference it. I even talked about it sometimes not in science." She continued to explain her students had discovered sequence and main/idea non-technical terms during guided reading groups. She said, “They connected to it because we made it right there in front of them.” Each science class [section A & B] has their own chart of non-technical terms for each rhetorical structure they have studied in science. Melanie stated that if she has the wrong chart up, the students would inform her, “That’s not our class----the one that’s up.” She continued, “They take ownership in the one that’s theirs and that they had a part in making. I think it even worked better than just having one pre-made---doing it right there in class. So, I found success with that.”

I asked Becky if she has specifically taught non-technical terms when she taught the rhetorical structures sequencing and compare/contrast. Becky replied, “We did the same thing in our writer’s workshop today. They gave them a compare and contrast one. It’s so much easier because they have done it in reading and science and now we are making the connection in writer’s workshop.”

Jody described the non-technical vocabulary instructional strategies she had been implementing. Jody answered, “We went through that a lot with compare and contrast. Students told me what the word compare means and we discussed it in class. I wrote it on the board so the students would see it. They were involved in the different wording and then a couple days later we went through the lesson a second time and I know, at least in one class, one of the comments the students made was ‘Wow. We came up with a lot more words than last time.’” I asked Jody if the students had been able to find any of the non-technical terms in the textbook and she said, “I can’t tell you about that. I don’t know that we’ve – I have not actually gone through the lesson and asked them to pick out these words." For clarification I asked Jody if the compare/contrast non-technical words she taught them weren't necessarily the terms used in the science text to show comparison and differences. She answered, "Right.

Assessment. I asked the teachers to describe how they assessed science textbook reading comprehension. Melanie explained she began science reading comprehension assessment by giving the commercially-made end-of-lesson tests but after having administered it a few times, she decided they weren't "great tests." She said they were "picky details and just a random sampling of small things rather than big ideas and other things we had hoped they would understand and be able to use by the end of instruction." Melanie explained the critical thinking questions on these tests were difficult for third graders as they "required a dual answer – it can either be like compare these two things. I think that's kind of a new third grade thing that you are expected to write your thoughts in an answer, forming a sentence. Not a lot of – you could almost tell they were thinking it in their head but just didn't get it down on paper. You knew they had reasoning behind it but they just didn't get it down on paper." I asked Melanie if teaching compare/contrast, main idea/idea, and sequence helped her students to answer the critical thinking question and she responded, "I do and if we prepared them for those questions, it would be even easier for them."

Melanie said that she continues to use the commercially made end-of-chapter tests but by doing so, the students are formally assessed about once a month. She felt these tests were "okay." Melanie continued, "They do a nice vocabulary assessment which is just matching but it forces them [the students] to know some of those words which is good." She said, "The multiple choice questions are for the most part okay. They [the students] have to do a little bit of writing which is kind of nice to see what they know. Because some kids will tell you a lot in their writing that you might not have known just circling a, b, c, or d." She continued, "I do a lot of informal – I guess observation – talk to your neighbor about this and I'll just go around and listen or I'll ask a question and look for responses. I think just through observation, sometimes you can tell who understands it and is able to contribute to discussion and who – it totally flies by over their head." Melanie explained if her informal assessment revealed several students not understanding the concepts, she re-teaches the whole class. However, sometimes she coaches one student along by rereading a certain section of the text. Melanie explained that she also utilized the commercially-made vocabulary sheets to review the terms; she is interested in discovering what the children have missed. She returns the graded vocabulary sheets to her students to utilize as a tool for reviewing before a test.

Becky explained she was going to administer the chapter-two science test soon. "We have been working and working and I think the next assessment will give me a better idea of where we are." She also stated she was pleased with the results of the vocabulary section of the previous end-of-chapter test. Becky explained student assessment in terms administrating the end-of chapter tests.

Jody stated that she had used the end-of-lesson quizzes made by the textbook company. "Some are better than others. Some of them hit some of the main ideas in the lesson and others just pull out the small details. So this being my first year going through this book, I'll probably do some sorting out next year." She continued to explain that she was not, at this point, comfortable with the textbook. "…right now, we are all kind of fumbling around with this." I continued to probe Jody by asking how she knew students could compare/contrast and classify. She explained that she informally assesses her students through observation during hands-on activities and from what they say to her. "Just little messages they give - some of it's just you can tell from just observing the students or when they talk to you – what they say that would indicate that they understand."

Amount of time for each lesson. I asked the teachers to explain any benefits the students had received from instruction in rhetorical structure and non-technical terms and if the benefits justified the amount of extra time it has taken to plan and teach the science textbook lessons. Melanie answered, "I'm glad to be doing it at this point in textbook adoption. Knowing that next year I can pull out that graphic organizer that I've already designed for sequence – I've got some of those words noted with sticky notes. I'm putting in the time now but I think it will pay off down the road. I'm getting better at knowing how to teach it and I think the kids will get better. And I hope that by next year these kids will know some of these things and they are not having to learn text structure again and they are not having to learn all those new words again. I hope they are getting at least getting a real good instruction here and can build on it in other years."

Becky explained, "But I am saving all my things for next year so it won't take me that much time. I'm getting more organized in things I want them to do and have them do. I'm just filing it away so next year it won't be the creating of the stuff I want them to do. It will just be reading and doing. I think that will help me. Plus it's a new book. You just kind of expect to do that with a new book." I probed Becky to discover if she saw other effects of teaching text structure, other than being more organized for the subsequent year. She replied, "It's making them see the material and organizing it in a variety of ways. Sometimes they will say, 'Can I do it this way?' or 'Can I make a flow chart and show you sequence instead of compare and contrast?' so even just giving them license to pick a structure that they want to use. Sometimes they will just be doing things on their own like." Becky's statement suggests she did not fully comprehend the concept of rhetorical structure. In order to gain more insight into her understanding, I asked her to state the degree of ease she had in identifying the text structure of a science lesson. She answered, "My book is pretty good about giving me what they want to use. If I agree with them, we do it and if not, I just – maybe there is one we are talking about in reading that I think, "Oh this will work here, too." It doesn't bother me. I'll use the one in the book if need be. Otherwise I'll substitute something I think they understand that will work just as well with what we are doing." Becky's statement suggests she confused the reading skill which the textbook suggests for each lesson with the actual structure in which the text is written. Becky's final comment was, "It is easy for me to do because it's not isolated. There are connections all over the place and it's just kind of made me aware of what we can do and the way we can use those throughout the science lesson and non-fiction reading."

Jody described the pros and cons or implementing rhetorical structure and non-technical vocabulary strategies. Jody stated that "the pros would definitely be the students get their understanding of the lesson. The con would be that it takes more time to get through a lesson and so I'm kind of divided on that one. Graphic organizers – I've always used and I like to use them specifically as a review. I have tried using them a couple of times as they are reading the lesson and I feel that one of the cons to the graphic organizer is if you are using it at that time, I feel that it is taking away from the student absorbing the actual knowledge and they are more concerned with filling out the graphic organizer. However, when you use it as a review, it becomes an important tool." She continued to explain when the students use a graphic organizer, "they pull out the high points of the lesson." She explained further "the rhetorical learning is sort of a sub-lesson, in the same manner in which I teach the students in the beginning of the year to use the reading diagrams and reading the captions under the pictures. Those are all kinds of study skills and I think the rhetorical learning is sort of a study skill. Those are the things they have to know in order to better understand it but I'm not real keen on doing it every [sic] or using it or re-teaching it every single lesson and always bringing it up."

Methods of textbook reading. Jody made additional comments during her interview. She explained she really believed in reading the textbook aloud or reading it with a partner and discussing it as the best strategies. She has memories of reading a text and when she was through not being able to recall any of the concepts she had just read. She feels that her young students could possibly have the same problem and the problem is solved by reading the text together in the classroom. Confusing parts or unknown technical terms can be discussed. "You start talking about it and talking through it right after they've had it introduced to them and not making it an isolated fact 'over here' but putting it with the lesson itself. I think it makes more sense to the students." I investigated further by asking how she helps her students to become independent science readers. Her answer was, “Pretty much, all of the above.” (She was referring to the students reading the text aloud in class and discussing the content as they read.) She continued to explain, “So, anything I can use – any method to teach them – be it a video or activity – anything I can show them or let them do that would help them to understand a little more because this is such complicated material. I guess that’s why I’m so into reading it together in class.

Summary. All three teachers stated they were teaching rhetorical structure in connection to their science lessons. Melanie indicated she was teaching the rhetorical structure that aligned with the textbook lessons. Becky’s responses suggested the rhetorical structures she was using in science class were ones which the students were familiar and had discussed in other curricular areas; she did not match instruction to the rhetorical structure of the text. Jody stated that she taught rhetorical structure with some but not all of her science lessons; the rhetorical structures she taught were ones that both aligned with the science lessons and were ones with which her students were familiar and understood. Both Melanie and Jody expressed an understanding that new instruction in rhetorical structure was a sub-lesson of the actual science lesson; Jody described rhetorical structure learning as a type of study skill.

Melanie and Jody described their instruction in non-technical terms that aligned with the rhetorical structure they taught. Melanie introduced the non-technical terms and their meanings, found examples in each science textbook lesson, and with her students, created a chart of non-technical terms for each rhetorical structure. She modeled the use of non-technical terms in the graphic organizers. Becky's reference to non-technical terms indicated the students had been introduced to compare/contrast non-technical terms during writer's workshop. Jody indicated she reviewed compare/contrast non-technical terms with her students prior to reading a science lesson written with this structure but she was not sure if the terms were in the science textbook or not. She encouraged her students to use compare/contrast terms in the graphic organizers.

The teachers indicated their students had benefitted from the new instructional strategies. Melanie and Becky specifically noted their students were making cross-curriculum connections in identifying non-technical terms.

The commercially-made textbook end-of-lesson and end-of-chapter tests were used for assessment by all three teachers. However, Melanie discontinued the use of the end-of-lesson assessment; Becky never did use this assessment. Jody eventually altered the end-of-lesson assessment by adding a vocabulary matching section. Melanie and Jody described informal assessments such as listening to student conversations and responses.

All three teachers utilized graphic organizer with their science lessons; the organizers aligned with the rhetorical structure of the lessons. Melanie utilized organizers with every lesson while Becky and Jody included organizers with some of the lessons. The teachers indicated they felt comfortable in utilizing organizers and felt the organizers aided students in locating and recording key concepts in the textbook lessons.

The teachers were in agreement that implementing the new strategies were time-consuming but the process was worthwhile because they would be better prepared for the subsequent year of science textbook teaching. Melanie and Becky stated their students were building a foundation of knowledge about rhetorical structure. Melanie and Jody felt knowledge about rhetorical structure facilitated their students' comprehension of the science text.

Post Third Workshop Observations

The third professional development workshop took place the twelfth week of the study; it began with a discussion session.

Workshop discussion. At the beginning of the workshop, the teachers discussed the instructional strategies they had implemented during science textbook lessons since the last workshop. Jody, the fifth grade teacher, was ill and absent from school on the day of the workshop.

Rhetorical structure. Becky stated the fourth graders had "done a lot of compare and contrast because we are working on biomes right now. Some of these things are just such a natural fit that the kids kind of 'This will work great here.'" She has three students that "take the initiative all the time to tell me how we're going to do something" because they had done it before. Melanie explained her third graders had done a lot of cause and effect. She continued, "It's seemed like a natural fit. We're talking about how ecosystems change, so it's *cause* and then *as a result*, the different things happen. So we've done several cause and effect lessons." She described the degree of success she has had in teaching cause and effect. "Pretty well. I think it was slow at first because it was a totally new concept, I think, for third graders and not one that is particularly easy to grasp. It's tough, I think, at first. But the more they practice it, the more they are getting it." Becky pointed out that cause and effect is a fourth grade assessment and once students have been exposed to cause and effect, she can build upon that concept; a learning foundation was being established.

Non-technical terms .Melanie named the non-technical terms she taught during cause and effect instruction. "There were actually quite a few in the science book such as *if*, *so*, *as a result*, *if then*, *cause* and *because.* She explained her students had to make inferences to figure out a cause if there was not a word to signal it. She stated, "But it was there. So that was the trickiest one, I think." Both Melanie and Becky stated that background knowledge, their real life experiences make a big difference in children's ability to infer when reading science text that does not consistently use non-technical vocabulary terms.

Graphic organizers. The teachers described the graphic organizers they had been utilizing in their science classes. Becky stated her fourth graders were using foldables. (Constructing foldables is an activity found in both the third and fourth grade science texts. Foldables are made by folding a piece of paper lengthwise and make one to two inch cuts perpendicular to the fold. A vocabulary term is written on each strip of paper; the strip is folded back to provide room for the student to write a definition and give an example.) Both teachers explained their students use the foldables to review vocabulary terms; they felt this was a successful way for students to learn vocabulary. Becky stated her students were permitted to copy definitions from the textbook. She measured success of this activity by noting the increasing number of students who could complete the foldable independently.

Vocabulary instructional strategies. The teachers described the vocabulary strategies they had been implementing. Becky said, "We've done what you did with us. What do you think this means? I've finally gotten them past the point that you can be wrong. They always want to be right. I tell them, 'I don't care what the right thing is. What do you think it means? Do you have any connection? Look at the base word. Look at whatever." Becky's statement suggests she had tried the vocabulary strategy, *Possible Sentences.* Becky explained that she also utilizes the commercially-made vocabulary cards that came with the science textbook. Melanie stated she has her third graders create their own vocabulary cards by writing the term on one side and using the other side of the card to write the definition, a synonym, a sentence and create an illustration. She does not ask her students to complete a vocabulary card for every term suggested by the book; she chooses the three most important terms. I asked both teachers if they were using the vocabulary terms in their graphic organizers and Melanie answered, "Yes."

Successful science lessons. I asked the teachers to identify recent events, episodes or strategies they consider to be effective and/or successful. Becky stated her students had done really well on a test after they had reviewed. Melanie replied, "The more we practice the vocab, I think that really helps. Tests are very vocab driven. The whole front page is vocab They have to know vocab for the rest, too. To use it in sentences, to do multiple- choice, they have to know it. So I think that has helped our results." Becky added, "I think the number of questions I get on those tests are down, cause they know the words in the questions they are reading." Both teachers stated they currently were doing a better of job of teaching vocabulary because they were learning new instructional strategies in the workshops and the new science textbook emphasizes vocabulary more than the old textbook.

Weak points of lessons. I asked the participants to identify what did not go well in the science lessons they taught. I gave the example of Jody's frustration with the strategy, *Possible Sentences.* I explained that Jody feels if students learn something "wrong" it takes many practices to undo the learning. Becky replied to this example, "I don't know. We have misconceptions that we address all the time. Maybe fourth graders aren't that ingrained. I don't know. That's interesting." Melanie stated her only frustration is the amount of time. "When one lesson takes a week, it's hard to get through as much as you would like to. Time has been an issue." Becky commented the subsequent year might not be as frustrating because the students will have a foundation of knowledge. "This year's not bad, but next year when they have done all those things. You know, there won't be as many blank looks."

Workshop content. Research data supports the effects of reading comprehension improvement and recall of information when students summarize passages (Taylor & Beach, 1984; Rinehart, Stahl, & Erickson, 1986; Mastropieri, Scruggs & Graetz, 2003). Other studies, i.e., Dicecco & Gleason (2002) support the effectiveness of graphic organizers on students' abilities to summarize. The third professional development workshop focused on utilizing graphic organizers to summarize science textbook lessons. During the workshop, I modeled a science lesson emphasizing the steps for instruction in text summarization: (1) identifying and teaching the rhetorical structure of the text, (2) identifying and teaching the non-technical terms that signal the rhetorical structure, (3) displaying core text concepts in a graphic organizer, and (4) utilizing the completed organizer to summarize the main ideas of the science text. A secondary focus of this workshop was demonstrating informational text, such as a science lesson, can be written in more than one rhetorical structure. Consequently, appropriate instructional strategies for multiple text structures need to be implemented to facilitate student comprehension. During the modeled science lesson, the participants were asked to identify the multiple rhetorical structures found in a science article and to select an appropriate organizer for each structure. At the conclusion of the modeled science lesson, I reiterated the steps of graphic organizer construction: (1) important concepts are recorded in an organizer whose pattern aligns with the rhetorical structure of the text, (2) non-technical terms that signal the rhetorical structure are included in the organizer, and (3) key vocabulary terms are used in context within the organizer. I asked the participants to continue implementing the strategies taught in all three workshops including the newest strategy of summary writing using the graphic organizers. I requested to observe all the days each science textbook lesson was being taught.

The participants expressed concern in finding time during science lessons to teach summarizing. I suggested that summarization could be a language arts lesson taught during the language arts block and then connected to science at the conclusion of a science lesson.

Third Grade Lesson Observations

I observed Melanie teach three complete science textbook lessons and the beginning of another lesson during the time period between the third professional development workshop and the end of the study. My observations include eight sessions in section A and five sessions in section B. The content, delivery and duration of the science lessons differed between sections A and B. The duration for each science lesson for Section A, Melanie's own students was consistently 35 to 40 minutes, while the duration for the lessons for Section B was restricted to 30 minutes. The differences in content and delivery are described in the data collection results that follow.

Chapter Four – lesson three. I was invited to observe lesson three, *Living Things in the Past* one week after the third professional development workshop. Melanie identified four rhetorical structures in the textbook lesson.

Prior knowledge; technical vocabulary. Melanie began this lesson for section B by asking the students to examine a photo on the introductory page of the lesson and read the caption. The photograph depicts a fossil bed located in the same state in which Melanie's school is located. She probed the students' background knowledge on fossils and this particular fossil bed. Melanie directed her students to turn to the first page of the lesson to examine the two vocabulary terms associated with this lesson, *fossil* and *extinct.* She informed them they would complete vocabulary concept cards for these terms for homework.

Non-technical term; first rhetorical structure. Before the students began reading the text, Melanie reviewed the non-technical terms located on the students' cause and effect chart. Melanie read the first two paragraphs aloud; she read the paragraphs one sentence at a time and the students read each sentence after her. After each sentence was read, Melanie asked the students to identify any cause and effect non-technical terms in the sentence. After reading the sentence, “Many scientists think that dinosaurs became extinct after a meteor hit Earth a long time ago,” Melanie informed her students they would have to infer the *cause* since the sentence did not contain a signal word. After she asked what caused the dinosaurs to become extinct, a student replied, “A meteor hit earth.” Melanie wrote on the white erase board, “a meteor hits Earth ➔ dinosaurs became extinct,” after which she provided her students additional information about this specific cause and effect relationship.

Second rhetorical structure. Melanie informed her students the subsequent paragraphs were sequence not cause and effect. She read the third and fourth paragraphs aloud after which she asked her students to sequence the events in the paragraph. The sequencing was done orally with the aid of the sequence technical terms the students had recorded on their sequence word chart.

Third rhetorical structure. Melanie directed her students to turn to the third and fourth pages of the lesson and informed them the two pages were main idea/detail. “We are going to read to find the main idea and the details that follow it.” She read these two pages to the class aloud. A discussion followed and the students agreed the heading on the third page was the main idea. The heading is written in question format, so Melanie changed it to read as a statement.

Release of responsibility. Melanie did not release the responsibility of determining the rhetorical structure to her students. She informed them each time the rhetorical structure changed. This was the first time she had taught a science lesson written in multiple rhetorical structures.

Difference in configurations of reading. Melanie read most of the text to the students in section B. However, in section A, the students read the text aloud; each group (learning pod) read a paragraph.

Difference in instructional methods. Melanie used a different strategy in section A to facilitate the identification of the main idea and details found in the last section of the lesson. She wrote on the white erase board, "Studying fossils can help us learn new things." She drew a box around the sentence and drew an array of lines leading from the box. She informed her students they were going to learn five details that support the main idea written in the box. She called upon a student to read the first paragraph in the last section after which she encouraged her students to identify details that supported the main idea. She said, "What is one thing we can learn from fossils? Tom (pseudonym) just read it. If you are not sure, you can go back and reread it." The students one-by-one identified supporting details which Melanie wrote on the lines extended from the main idea box on the white erase board. Melanie called on students to read the second and third paragraphs in the last section. After each paragraph was read, Melanie directed her students to identify supporting details for the main idea. Science class was concluded after the last detail was identified.

Rhetorical structure mini lesson; non-technical terms. Melanie began the second day of this science lesson for section A by presenting a new word chart for the rhetorical structure - compare and contrast. She directed the class to compare and contrast two girls in the classroom during which the students generated a list of compare/contrast terms. Melanie wrote these terms on the class *Compare/Contrast* chart.

Rhetorical structure; non-technical terms; graphic organizer. She then directed her students to turn to the last page of the lesson informing them the paragraphs were compare and contrast. She drew a large Venn diagram on the board and asked her students if they had seen this drawing before. One student identified it correctly, stating he had seen it in math class. Melanie explained they were going to use the Venn diagram to compare and contrast wooly mammoths and elephants. She read the first paragraph of the last page of the lesson aloud, directing her students to listen how wooly mammoths and elephants are alike and different. The student identified similarities and differences by utilizing both the text and the photographs on the page. The girl students read the second paragraph aloud in unison after which several students identified a cause/effect term, *as a result.* Melanie directed the students to identify how wooly mammoths and elephants use their trunks in similar ways. The third and last paragraph was read in unison by the boy students; Melanie read with them. After the reading, Melanie pointed out the term, *resemble,* means *alike.*

Multiple graphic organizers .Melanie concluded the lesson by asking her students to turn to the first page of the lesson and identify the rhetorical structure. She continued to direct her students to examine the subsequent pages of the lesson to identify the rhetorical structure for each section. (This particular science lesson had four different rhetorical structures.) For homework, Melanie directed her students to reread the lesson. She provided them with a piece of paper containing four graphic organizers (see Figure 4.12), one for each of the rhetorical structures found in science lesson three. Each graphic organizer was titled with the appropriate rhetorical structure and the page number(s) in the textbook where the information for the organizer could be located. Melanie directed her students to complete the graphic organizers as they reread the science lesson. She suggested to her students to locate the non-technical terms for each rhetorical structure to facilitate their completion of the graphic organizer. Melanie moved the four student-generated charts of non-technical terms, each associated with a different rhetorical structure, to the front of the room as a reference for the students. Melanie used the term, *text structure* as she gave the directions.

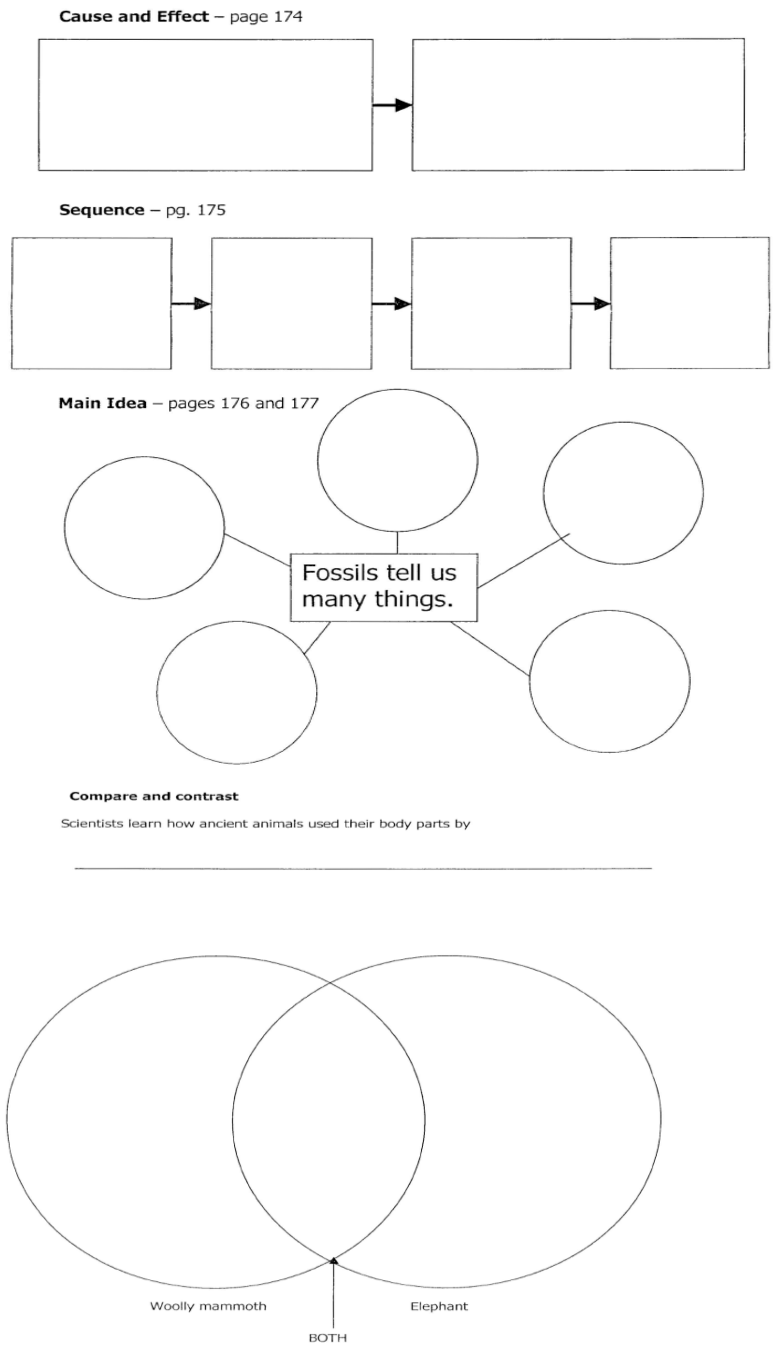


*Figure 4.12.*Graphic Organizers for Chapter Four – Lesson Three

Summarizing the lesson. Melanie began the third day of the science lesson for section A by asking the students if were possible for third graders to remember everything they read in their science book. After the students provided a negative answer, Melanie asked them to identify what she would want them to remember. The student answers included: (1) “The important stuff,” (b) “The highlighted words,” (c) “Facts.” Melanie informed her students they were going to use their graphic organizers to summarize the lesson by writing the main ideas of the lesson in paragraph form. Utilizing the completed graphic organizers, Melanie and the students collectively developed a main idea sentence and 6 detail sentences. The summary paragraph follows:

> We learn many things about the past through fossils. A meteor hit Earth which caused the dinosaurs to become extinct. During the Ice Age large animals roamed the land. Then the climate changed, ice melted and food was scare. Eventually the saber-toothed cats became extinct. Fossils tell us many things such as species, animal movement, size, diet, ate and changes over time. Some animals are similar to extinct animals like the wooly mammoth and elephant.

During this exercise, Melanie guided her students, asking them to examine their notes in their graphic organizers, one rhetorical structure at a time. She scaffolded the instruction by suggesting how many summary sentences the students needed to create for each rhetorical structure section. She prompted, “How can we turn those boxes into a sentence?” During the summary-writing exercise, the class decided to add the terms *soon* and *later* to their sequence word chart.

Melanie concluded the summary writing by informing the students of their accomplishment. “What we just wrote is five pages of your science book into one paragraph. We are going to practice and practice so you will get better and it will get easier,”

Lesson Reflection. After the third graders finished lesson three, only one academic week remained until the district's winter break. During that week, rehearsals for the school's winter music program were held during regular science class time. Consequently, Melanie did not complete a lesson reflection until classes resumed after the winter break. Melanie completed a written lesson reflection for this lesson at the end of the second academic week in January.

- Rhetorical structure: Melanie explained her decision to identify and teach all four rhetorical structures found in lesson three, chapter four in science. She stated she could not find one identifiable structure in the lesson but several. "They were all structures that the kids had learned before, so it served as a nice 'review' of all these strategies." Melanie described the degree success she experienced in teaching four rhetorical structures with four graphic organizers and described how she measured this success. "This lesson was the first where students went through the whole cycle – reading the text, learning the vocabulary, filtering important information with a graphic organizer and then writing a summary. We had done potions of this but the summary was a nice addition. It gave the kids the chance to use the vocabulary words in context as well as to review the concepts once again. Since the summary writing was very new, it was heavily modeled. I guess I don't have any 'concrete evidence of it but I felt like students understood this lesson the best. Many used it [the summary] to study for their test and very few students missed vocabulary items, multiple choice items or short essay items that dealt with the content of chapter four, lesson three."

- Science textbook reading comprehension: I asked Melanie to explain how and why teaching the rhetorical structure of a text facilitates students' reading comprehension. Melanie replied, "Teaching rhetorical structure has been helpful in facilitating students' comprehension of science text. We are finally getting to the point, I think, where they are recognizing structures more than me just pointing them out all the time. They are looking for those non-technical terms on their own and beginning to sort out what's important vs. what's interesting vs. what's filler."
- Difficulty of multiple-structure instruction: Melanie explained the degree of difficulty in teaching a lesson with multiple rhetorical structures. "It was a nice review for the kids. It was a little more work for me (deciding how to construct the graphic organizers) but since the kids had experiences with all the structures, I think they adapted well. They were able to include all of these structures/organizers into one summary paragraph."
- Strong points of lesson*:* Melanie stated, "I liked the format or progression of how this went. I decided to try all of chapter 5 the same way (read, vocabulary, graphic organizer, and summary paragraph), scaffolding a lot at first and gradually giving the kids control. I got the sense, after teaching this way, that some kids will need more guided practice than others, but it's nice to have finally gotten through a lesson in 3 days (although the fourth day we did some other hands-on activities – experiment, mini book, etc.)"

- Weak points of lesson: I asked Melanie what she would change the next time she taught this lesson or one similar to it, she replied, "I can't think of anything at this time. I guess encourage students to develop their own topic sentences, include information from the graphic organizer. I am wondering whether over time, they could even write summary paragraphs with the use of the graphic organizer.'

Chapter Five – Lesson One. At the beginning of the second semester, Melanie informed me she had worked on developing her science lessons over the winter vacation. "Over the break, I did something that I'm pretty excited about: I charted out vocabulary cards, graphic organizers, and summary sheets for the rest of the book! I just put them in folders on the computer and will have them ready to go." She also indicated the current lesson they were reading (chapter five, lesson one) had no clear rhetorical structure; she was teaching main idea/detail and compare/contrast. After I received this email, I visited her classroom the following day.

Multiple graphic organizers. The students had read science chapter five – lesson, titled *Earth's Features* on the previous day. For their homework assignment, the students completed the vocabulary concept cards for six terms. The day I visited section A, the students independently completed teacher-made graphic organizers for the lesson. (Melanie helped a small group with the organizers by working them at the reading table.) Each organizer aligned with the structure of a particular section of the science text. All the organizers were printed front and back on two sheets of paper for a total of five organizers. Each organizer had a heading and the science text page numbers indicating where the information for this organizer could be located. The organizers included (1) main idea/detail, (2) fill-in-the-blank, (3) spaces for student to draw pictures to define various landforms and (4) a matrix to compare/contrast the layers of the Earth.

Guided instruction for special needs students. During this work session, students occasionally approached Melanie with a question; she redirected them to their textbook. Melanie provided guided instruction for the small group working with her. It appeared she was careful not to give answers to these students; she encouraged them to find answers in the textbook. She accommodated this group by allowing them to draw pictures of the landforms instead of writing a description. As students finished their graphic organizers, they were permitted to conduct content-related research on the Internet.

Summary writing. Melanie began the second day of the lesson by providing the students with a teacher-generated form for summary writing. The paper was titled, "Summary – Chapter 5, Lesson 1." A line for the student's name was provided and the remaining part of the page contained lines, the first one indented. Melanie also returned the students' completed graphic organizers. It appeared the Melanie had evaluated the organizers. Melanie directed her students to examine the topics of all the organizers to develop a topic sentence for the entire lesson. Several students made suggestions which Melanie wrote on the white erase board. For example, she wrote, "The surface of the Earth above and below the ocean are similar," and "Earth has a variety of structures and features." After the main idea sentence was determine, Melanie directed her students to examine the first graphic organizer and synthesize the information into one sentence. She solicited ideas from her students. The following are examples of these are ideas: (1) Most of the water on Earth is salt water and is found in oceans and (2) There is less fresh water than salt water and it is found in fresh water lakes. After examples were provided, Melanie encouraged her students to write their own sentence. Then, she directed her students to look at the next completed organizer and synthesize that information into a sentence. She continued this process until the students had the opportunity to write a sentence that combined the information in each organizer thus completing the written summary of the lesson.

Chapter Five – Lesson Two. Melanie determined cause and effect was the rhetorical structure for lesson two, Sudden *Changes to Earth.* Content and delivery were similar across sections A and B.

Pre-lesson discussion. I arrived in Melanie's classroom before the students in section B arrived. Melanie told me she had evaluated the students' summaries for lesson one by checking to see if the students had summarized each section of the graphic organizer; she took points off it they left out sections of the organizer. After the students arrived, she returned their summaries and explained how she had graded them. Melanie talked to her students about adding unnecessary or extra information such as things the students knew but were not found in the text. She also informed her students about points being deducted if they left out summarizing one or more of the graphic organizers.

Purpose for reading; non-technical terms. Melanie introduced the new science lesson by directing her students to read the introduction after which they discussed the question posed in the text. She posted the class's chart of cause/effect non-technical terms on the white erase board and asked the students to guess why she wanted them to focus on it. One student referred to the introduction they had just read and commented it contained a cause/effect relationship. "An earthquake happened and then cars couldn't drive on the road." Melanie informed the students they were going to be looking for more cause/effect relationships in their science reading.

Configurations for reading; rhetorical structure of lesson. Melanie read the first paragraph aloud, occasionally leaving out words which she expected her students to fill in. She then informed her students she was going to read the second paragraph aloud and she directed them to listen for cause and effect relationships. After Melanie read the paragraph, one student stated he saw a *cause*. However, Melanie explained that sometimes it was easier to begin with the effect. She directed her students to read a particular sentence in the text after which she asked, "What causes earthquakes?" One student responded, "The crust's rock moves and presses against each other." Melanie directed her students to find another cause in the textbook. The remaining pages of lesson were read aloud by students or groups of students in unison. Prior to the reading of each paragraph, Melanie prompted her students to discover certain cause and effect relationships. After reading each paragraph, the cause and effect relationships and the non-technical terms that signal this structure were identified and discussed. At the conclusion of the reading and discussion, Melanie assigned the completion of vocabulary concept cards for homework.

Graphic organizer. On the second day of the lesson two in section B, Melanie gave her students graphic organizers. The first organizer was the "falling dominoes" format. (Each falling domino organizer is a series of rectangles or "dominos" that are touching each other and are leaning in the same direction to simulate the effect of dominos hitting each other and falling.) Melanie instructed her students to complete the last domino in the series (the effect) first. She directed her students to turn to the first page of the lesson and locate the highlighted word, *earthquake.* She informed them *earthquake* was the first effect. She then directed her students to find the first cause, the second cause, etc. of earthquakes and write them in order in the first dominos by working backwards. The worksheet contained a different graphic organizer for each cause and effect relationships found in this lesson. Each organizer had the page numbers from the science text to indicate where the cause and effect could be located. Melanie wrote science text page numbers next to each organizer to aid the students in locating the needed information to complete the organizer.

Lesson Reflection. Melanie completed a written lesson reflection that asked questions about lessons one and two in chapter five respectively. The reflection was completed two days after the conclusion of lesson two.

- Rhetorical structure: I asked Melanie to explain why she taught multiple rhetorical structures with each lesson. She answered, “It’s how the text was set up. It seemed to make sense that kids organize the information in the same way it was written.”
- Graphic organizers and belief statement*:* Melanie explained why she used several graphic organizers for lesson two. “This lesson dealt with ways the earth changes quickly: earthquakes, volcanoes, landslides and floods. The text, basically, gives causes leading up to each and effects after each happened. The causes leading up to each seemed to match the domino cause and effect graphic organizer while the

after-effects were more ‘earthquakes could cause____, or____or ____.’ It’s a subtle difference but it made sense to me to do it that way. I tried to teach the domino effect to kids on day one so that the graphic organizer would make a little sense. I think it did for most kids.” Technical vocabulary and belief statement: Melanie stated she discusses the vocabulary terms before and during textbook reading. After the lesson is completed, students are expected to complete vocabulary concept cards for each vocabulary term. “It’s the routine we’ve used with vocabulary for several chapters now. I like that students are forced to think – especially for the ‘synonym’ and ‘sentence’ portions. Not all thesaurus entries are necessarily synonyms and sentences have to be crafted so that the word is used correctly in context. This activity seems to be more meaningful than simply copying down definitions or doing a worksheet.”

- Non-technical vocabulary and belief statement*:* Since her students had learned about the rhetorical structures in previous science textbook lessons, for these lessons Melanie reviewed the non-technical terms. “We did get out the posters [with these words on them] as we did the reading but it was all review. The lessons did go A LOT faster and smoother because I didn’t have to teach the structure. We could simply do the reading and (with some guidance), kids were able to pick out the relationships between ideas using non-technical terms. I can only imagine it’ll get easier for them as the go through fourth, fifth, sixth grade and beyond. Hopefully, teacher guidance can fade into independent use

- Summarizing and belief statement: Melanie described the degree of success her students had in summarizing each science lesson using graphic organizers as a guide. "My students, so far, have done three summaries. I had planned to begin with full scaffolding, move into guided practice and will eventually give students a chance to work on these summaries on their own. The tendency I've seen on most summaries is to include **everything**. It's hard for students to generalize or to lump ideas into a succinct sentence." She continued, "I would say comprehension of the text is definitely enhanced by use of summary writing. Students are forced to restate the big idea of the lesson (topic sentence) as well as the content in their own words. It's a wonderful authentic assessment. I'm really proud of what students have been able to do with guidance but especially on their own. It's taken extra time to provide the scaffolding necessary but it's a nice investment when you see students able to do eventually."
- Strong points of lesso*n:* Melanie explained the best aspects of lessons one and two. "I do like that kids have to be accountable for their reading and vocabulary (day 1) because they're going to see the same information on day 2 in the graphic organizer and on day 3 in the summary paragraphs. It becomes pretty obvious which portions kids don't understand. I like the way our summary paragraphs are turning out. I'm still providing some kids with some guidance but for the most part, kids are able to write these on their own. Graphic organizers are also becoming more 'doable' for kids. It will be interesting to see how the chapter 5

test goes. Working with small groups of kids who struggle at the back table has worked well for kids who need extra support/help."

- Weak points of lesson: When I asked Melanie what she will do differently the next time she teaches these lessons, she identified as not having enough time for science as the most significant problem. "I wish I had about 10 more minutes every day for science. That may be a scheduling thing we address next year." She stated her students do a lot of science work at home such as the vocabulary concept cards, finishing up graphic organizers and summaries. "I'd prefer they had enough time in class to finish these up because I end up having to 'chase down' kids who aren't finished and spend entire recesses (my planning time) with kids who need help."

Chapter Five – Lesson Three. Lesson three was titled, *Weathering and Erosion.* The time allotted for the research project permitted me to observe sections A and B on the first day of the lesson.

Configurations for reading; technical vocabulary. Melanie began section A by asking her students to identify different ways to read their science text. The students named a variety of methods such as self-read, round robin, and the teacher reading the textbook aloud to them. Melanie explained to her students they were going to be placed into small groups where they could choose how to read their science lesson. She stated they were required to discuss each page after they read it. Melanie established other guidelines for group work and then distributed the packet of papers which contained four-part vocabulary cards for the four vocabulary terms. She instructed her students to complete the vocabulary concept cards after they finished reading the science lesson. The criteria used to group the students for their small science reading groups was not evident.

The students read science lesson three in four small reading groups. The students in two of the small groups read the text in unison within their group. A third group read the science lesson in the hall while a fourth group met with Melanie at the reading table. It appeared the group working with Melanie needed her guidance; the students in this group took turns reading the text paragraph by paragraph. Melanie helped with the pronunciation of words, kept students on task and engaged them in discussion after each paragraph was read by questioning them.

Technical vocabulary. While the students were completing their vocabulary concepts within their groups, I overheard one student comment, “This is the hard part for me when I do it at home---the synonym. This student’s group members brainstormed for a synonym for the term “weathering” One student suggested, “chipping away.”

Classroom management. The classroom management differed from section A and section B; with section A, Melanie spent more time managing the independent small reading groups and less time working with the small group at the reading table. However, with both groups she demonstrated her ability to change the structure of her classroom by turning over the responsibility for learning to her students.

Fourth Grade Lesson Observations

I observed Becky teach two complete science textbook lessons during the time period between the second and third professional development workshops. I observed six sessions in section A. Becky informed me ahead of time she would not be teaching any science the last week of school prior to the district's winter vacation.

Chapter Three – Lesson Three. The title of lesson three was *Relationships in Ecosystems.* I was invited to observe one week after the third professional development workshop.

Hands-on activity. At the beginning of science class, the students examined their current science experiment. The students had planted turnip seeds in two Styrofoam cups; one cup contained "unpolluted" potting soil while the other cup contained potting soil that had been "polluted" by a substances selected by the students. Beck asked the students to identify the variable in the experiment.

***Technical vocabulary*.** Becky began lesson three by introducing seven new vocabulary terms. She distributed a matrix to each student. The matrix had a space titled, "What I think it might mean."   She instructed her students, "Think what each of these words mean or give me an example. If you don't know, leave it blank. Use educated guesses. Look at the root to figure out what it means. Remember, we talked about 'er' words." While the students worked to complete the first part of the matrix, Becky informed me she had used this vocabulary strategy several times in the past. After the students were given a period of time to write their perceptions of the meanings of the vocabulary terms, Becky used the commercially made vocabulary cards to provide the students with a formal definition for each term. The vocabulary cards have a picture that accompanies the definition. Becky provided additional information for each term after she read the definition. For example, when she read the definition for *food web* she cautioned her students not to confuse it with *food chain*. For the term, *competition* she connected the meaning to a basketball game. She directed her students' attention to the suffix "er" in the term, *consumer* stating its meaning as "one who consumes." After the definitions for all terms were read from the vocabulary cards and discussed, the students read the list of vocabulary terms in unison. Becky then reviewed the terms through questioning. For example, she asked, "I am thinking of an organism that cannot make its own food."

Becky concluded the lesson giving a vocabulary homework assignment. She instructed her students to complete the matrix by looking each term up in the glossary in the back of the science textbook and writing the definition in the appropriate space in the matrix. She encouraged her students to write the definitions in their own words if they could. After these directions, Becky engaged the students in a new science experiment.

Technical vocabulary. Becky began the second day of lesson three with a review of the seven vocabulary terms she introduced the day before. She utilized a website provided by the science textbook company; the website page (a crossword puzzle) was projected onto the screen in front of the classroom. A student read a clue after which the class collectively decided on a response and a third student typed the answer in the puzzle. After this exercise, Becky directed her students to read in unison the list of vocabulary terms.

Configurations for reading. Becky then directed her students to open their science books to the beginning of lesson three. The first two pages of the lesson were read aloud by average to advanced readers called upon by Becky; she read one of the paragraphs on the first page of the lesson. After each paragraph was read, Becky engaged her students in a discussion of the content by asking them questions and providing additional information through direct instruction.

Film clip. After the textbook reading, she showed her students a film clip from the textbook website which contains further information about decomposers. After the film clip, Becky asked her students to identify three decomposers and to name the steps in the cycle of decomposers.

Becky concluded the lesson by distributing the homework assignment, a matrix for producers, consumers, and decomposers (see Figure 4.13). For the first labeled column, Becky directed her students to either write a definition of the term or to describe the role of producer, consumer and decomposer in the ecosystem. Becky directed her students to write their answers “in complete thoughts.”

	Definition/role in the ecosystem	Source of organism’s energy	Examples of this type of organism
Producer			
Consumer			
Decomposer			

Figure 4.13. Compare and Contrast Matrix

Configurations for reading and discussion of content. Becky began the second day of lesson three by discussing the answers for the matrix the students had completely independently as a homework assignment. She then directed her students to open their textbooks and she called upon students to read the fifth page aloud paragraph by paragraph after which she question her students about the content. She also discussed the content and organization of a diagram in the textbook which showed an example of a food web and provided additional samples by drawing diagrams of other food webs on the white erase board. Afterwards, she presented described scenarios and asked her students to identify the predator and prey in each one. Becky did not direct her students to read sixth page of the lesson; she delivered the content of this page through direct instruction. After individual students were called upon to read the last page of the lesson paragraph by paragraph, Becky directed her students' attention to the illustration of an energy pyramid in the textbook. She engaged the students in a discussion about the content and organization of the pyramid.

Graphic organizer. After the lesson was read, Becky distributed a Venn diagram to each student, titled, *Compare and Contrast* (see Figure 4.14). She directed them to write the titles, *Food Web* above one circle and *Energy Pyramid* above the other circle of the diagram. She stated, "One each side, you are going to write how they are different. In the middle, you are going to write how they are alike." Becky and the students completed the *Food Web* part of the diagram together; the students either worked independently or within their pods to complete the rest of the organizer. As they worked, Becky informed her students they had been learning text-to-text, text-to-self and text-to-world. She stated, "We are doing that in here."

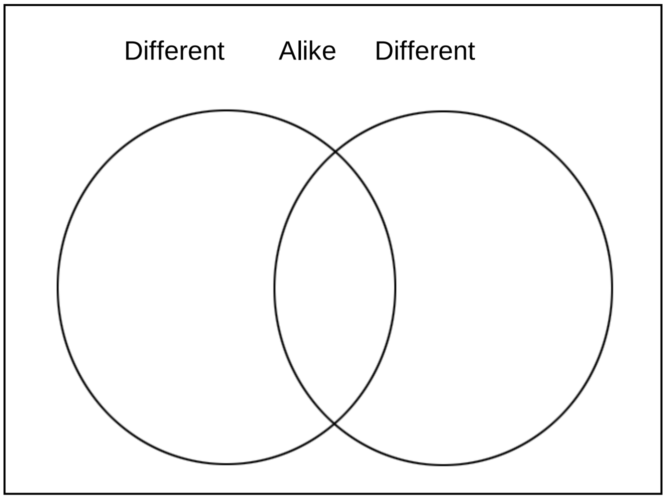


*Figure 4.14.*Compare and Contrast Venn Diagram

Lesson conclusion. Becky concluded the lesson by discussing the lesson summary written in the review section of the textbook. She helped her students to answer a review question posed in textbook by informing them where they could find the answer.

Lesson Reflection. Becky was unavailable for a lesson reflection interview before the winter break. Afterwards, I became ill and was unable to construct and send her a reflection form for this lesson.

Chapter Four – Lesson One. Becky indicated she was ready for me to observe three days after school resumed following the winter break. It appeared the fourth graders had been introduced to the vocabulary terms for this lesson the day before.

Technical vocabulary. On the current day, science class began with a discussion of the matrix the students had completed on the previous day (see Figure 4.15). The students had been assigned to write what they thought each term meant. Afterwards the discussion, the students were given time to finish the matrix by writing each term's definition found in the glossary and by drawing an illustration of the new vocabulary word.

New vocabulary term…	What I think the word might mean …	What the word really means	Draw an illustration of the new vocabulary word…
Adaptation			
Hibernate			
Camouflage			
Mimicry			

*Figure 4.15.*Vocabulary Matrix

Configurations for reading. After the vocabulary review, Becky directed her students to open their science textbooks to the first page of lesson one in chapter four. She then distributed another matrix for the students to complete (see Figure 4.16). Becky began by reading the first introductory paragraph. The remaining text on the first two pages of the lesson was read one paragraph at a time by students who were called upon by Becky. The content of the textbook was discussed; Becky directed her students to make connections between the text and past classroom events. For example, she asked, “How did the lab we did on Monday help us to learn about adaptation?”

Graphic organizer. When the students began reading the third page of the lesson, Becky informed them they would find the information to complete the matrix beginning on this page. Becky guided her students as they completed the matrix for the terms *behavior* and *camouflage.* She directed her students to the textbook pages where content describing these two concepts was found, read the paragraphs aloud and asked the students to identify the required information to complete the matrix. The lesson was concluded after the first four pages of the textbook lesson were read aloud by selected students. She informed the students their homework assignment was to finish the matrix. When the students asked, Becky gave them permission to use examples for the matrix other than those found in the book; this action suggests Becky used this organizer as a check for understanding as well as an organizer for the textbook content.

Adaptation	Define/Describe This Adaptation	List an Animal That Shows This Adaptation	Explain the Benefit of this Adaptation to an Animal in Nature
Behavior			
Camouflage			
Mimicry			
Body Structures			

Figure 4.16. Matrix for Chapter Four – Lesson One

Configurations for reading; delivery of content. Becky began science class the following day by providing her students with opportunity to share their answers on the matrix they had completed for homework; students were permitted to change their answers. Becky then directed her students to turn to the fifth page of the lesson after which she gave a detailed explanation for the conception, *interaction* found on that page. She called upon her students to give examples of harmful interactions between animals. Designated students read the last page of the lesson aloud one paragraph at a time. During this part of the lesson, Becky interjected stories to exemplify concepts presented in the textbook. Her stories included the topic of fleas and lice as examples of harmful interactions, a lengthy story about her observations of animal interactions when sea turtles hatch and a story about people using leeches to suck a person's blood for medicinal purposes in the past, such as the era in which Abraham Lincoln lived.

At the end of the lesson, Becky reviewed the core concepts by utilizing the textbook's website projected on the screen in the front of the room. The students filled in blanks in sentences by selecting from this lesson's key vocabulary terms. When a student made a wrong answer choice, the computer corrected the answer.

On the third day of the lesson, Becky distributed squares of construction paper. The squares were folded, cut and glued to form a base for a "three fold." The purpose of the three fold was to form a base for a diorama the students were going to create. She explained to her students, their dioramas would depict adaptations of an animal they preselected; the scene of setting of the diorama would be one of the four seasons. This hands-on activity provided the students the opportunity to apply the information they learned about animal adaptations in the text and through classroom discussions. The students used this science class to work on their dioramas.

Lesson Reflection. Becky indicated in an email communication, she would have her lesson reflection completed and I could pick it up when I picked up samples of her students' work. After I picked up the student work samples, I discovered she did not include her written reflection.

Fifth Grade Observations

I observed Jody teach two complete science textbook lessons during the time period between the second and third professional development workshops. I observed four sessions in section B. Jody was ill and unable to attend the third professional development workshop. I visited with her after school the day following the workshop and briefly described the process of utilization of graphic organizers to write summaries. I asked her to instruct her students in summary-writing using the lesson's graphic organizer(s).

Chapter Two – Lesson Three. Prior to teaching this lesson, Jody visited with me about this particular lesson. She acknowledged the lesson was written with more than one rhetorical structure. She told me the first two pages of the lesson were compare/contrast and she had planned on using a Venn diagram graphic organizer. She stated she was unsure how she was going to teach the rest of the lesson. I would like to note the science textbook authors suggest a reading skill at the beginning of each lesson suggesting for this lesson compare/contrast using a Venn diagram.

Science lesson - text structure. Jody began the lesson by directing her students to read the headings on the first two pages of lesson in the science textbook. The heading was "What are animal life cycles?" and the two subheadings were *Complete Metamorphosis* and *Incomplete Metamorphosis*. Jody asked, "Who can tell me how this text is set up?" One student named *compare/contrast*. Since the headings did not include non-technical terms that signal a compare/contrast relationship, it is plausible the student who answered, *compare/contrast,* saw the reading skill printed on the first page of the lesson.

Non-technical terms. Jody then reviewed the non-technical terms that signal a compare/contrast rhetorical structure, starting with the identification of terms that signal *contrast*. Afterwards, the students collectively listed non-technical terms that signal *compare*.

Configurations for reading. Jody called on students to read the first two pages of the lesson, one paragraph at a time. During the reading, Jody questioned her students about the content of the text and clarified terms. For example, she explained *rigid* means *hard and stiff*. Jody directed her students to examine the diagram on the second page of lesson which showed the three stages of both complete and incomplete metamorphosis. The diagram was created so the reader could compare and contrast the three stages of each kind of metamorphosis. The teacher connected the content of the text with Eric Carle's, The *Very Hungry Butterfly*.

Graphic organizer. After the first two pages of the lesson were read, Jody used an overhead transparency which duplicated the diagram in textbook to review complete and incomplete metamorphosis. She asked her students to state how the life cycle of a butterfly (complete metamorphosis) and the life cycle of a grasshopper (incomplete metamorphosis) were similar and alike. Next, Jody gave her students a Venn diagram to use to compare complete and incomplete metamorphosis. The science lesson concludes with assigned homework, a vocabulary crossword puzzle, to complete.

Goals; graphic organizer. On the second day of the lesson, Jody spoke with her students, encouraging them to set a goal of earning at least 80% correct on the end-of-chapter test. Next, she directed her students to take out the Venn diagrams where they compared and contrasted complete and incomplete metamorphosis. Jody emphasized the compare/contrast items must align; students must compare and contrast similar categories.

Summary writing. Next, Jody informed her students they were going to write a summary of the first two pages of science lesson three. She reviewed the steps in summary writing and encouraged her students to develop a topic sentence; she encouraged them to use their books as an aide. Collectively, the Jody and her students decided the definition for metamorphosis was a good topic sentence: Metamorphosis is a series of distinct growth stages. Jody continued to guide the summary writing by asking her students to identify two important concepts that should be included in the paragraph. The students named complete and incomplete metamorphosis. Jody encouraged her students to develop one sentence for each kind of metamorphosis; she stated each sentence must name all the stages of the metamorphosis it was describing. As the students collectively developed the summary sentences, Jody continually asked them to write about the two kinds of metamorphosis step by step, informing them the summary needed “to flow like a story.” She encouraged them to use their textbook to locate each subsequent step. However, she did not ask them to use their completed Venn diagrams as an aide. Jody concluded the summary-writing exercise by asking her students to decide if the paragraph included all they needed to know about the two pages in the text.

Jody informed her students the practice summary-writing exemplified how they would write a summary for the entire lesson. She asked them to identify a main idea for the entire science lesson. One student read the *Lesson Main Idea* provided by the textbook authors on the first page of the lesson and Jody affirmed it was a good main idea for writing a summary of the lesson.

Configurations for reading; lesson conclusion. Jody directed her students to open their science textbooks to the third page of the lesson. The third and fourth pages of the lesson were read paragraph by paragraph by individual students Jody selected. Jody discussed the content of the lesson with her students by asking them to recall facts. The last page of the lesson was read round-robin style. The conclusion of the lesson included the students reading and responding to the Lesson Review on the last page of the lesson.

Lesson Reflection. The lesson reflection interview was conducted after school on the day the last session of lesson three was taught.

- Rhetorical structure*:* I asked Jody if she had discovered more than one rhetorical structure in lesson three. Jody replied, "Well, I don't remember what they were. I know that we got to the last pages of the chapter and I did not feel that it went along with the compare and contrast. But I don't know if I actually pinpointed what it would be." I encouraged Jody to explain if she had looked at the rhetorical structure of the last three pages of the lesson. She answered," That one actually could be done in a compare and contrast because they are the same in that they are both fertilization but they are different in that there are two different kinds.

Actually, at the end of that page, the question is how external and internal fertilization is similar and then the second question is how they are different? So we didn't do the graphic organizer. However, we did get the information into the classroom." I asked Jody to describe the success the classroom discussion had on the students' understanding the two types of fertilization were being compared and contrasted. She answered, "I think it was pretty successful. I felt they understood there was [sic] two different kinds. I felt they knew the differences between one and the other and we did get into, actually a little bit of ratio in that the external fertilization is probably a less efficient way of fertilizing as compared to the internal fertilization. So some of those things were brought out in the classroom

- Graphic organizers: I asked Jody to describe her use of a Venn diagram for this lesson. She stated the diagram was distributed to the students after the reading and the students were given about 5 minutes to work on it. Afterwards, the students collectively reviewed their written answers while Jody wrote them on a Venn diagram placed on the overhead projector; the students were allowed to change their individual answers during the review. Jody stated she suggested the students utilize the Venn diagrams to study for the end-of-chapter test.

- Summary writing: I asked Jody to describe the summary-writing exercise she conducted with her students. She stated, "We used the same two pages on the complete metamorphosis and incomplete metamorphosis, and I used that because they had the graphic organizer in front of them. They are encouraged to use the book. I encouraged them to use the information out of the book to help create the small paragraph – the summary." She thought her students had a good concept of a summary paragraph before they began their summary writing. She felt the class discussion was essential during the summary writing, particularly the class discussion about using a definition for a main idea sentence.

- New instructional strategies: Jody identified new the instructional strategies she implemented whiling teaching lesson three. "That new part would be the summary, trying to summarize the lesson. This is a new concept for the students." She further explained she would be asking her students to summarize the entire lesson prior to taking the end-of-chapter test. The students would not be allowed to use their textbooks or the Venn diagram during the summary-writing exercise, a notion contrary to the workshop suggestions I provided for Jody. She viewed the summary writing in class as a scaffolded activity which was a practice for summarizing the entire lesson. The students were forewarned they would be asked to write a lesson summary prior to taking the test.

- Technical terms: Jody described how she taught the technical vocabulary terms for the lesson. "I taught it in the same way. The students used the flash cards again. They have requested that. They found success with it in the last lesson and actually I had two or three kids come and say, 'Well, if you choose not to, Mrs. Powers (pseudonym), can we do this on our own? So they have seen the success that can happen using these cards." Jody also commented that the *L to J* vocabulary test the students take every week contributes to student success with vocabulary. She described vocabulary success in terms of correct answers on the vocabulary portion of the end-of-lesson tests.

- Strong points of lesson*:* Jody stated, “I think today went well. I was happily surprised that they did so well on the Venn diagram by themselves and then when we put it together, they did a pretty good job of coming up with the summary for those two pages. I’ve got to say I was a little impressed with their ability to do that. So, of course, any time you see success that always makes it go well or makes you feel good about it.” She continued, “So for them to be able to come up with this summary means that they are getting some sort of an idea of where to find those main points within a specific amount of information.” I asked Jody if she felt the students recalled information from the text when contributing to the summary writing. She answered, “No, I don’t really. Because I specifically encouraged them to use the book. I need then to understand that their book is there and they should use it. I appreciate those students who can do recall but not everybody has that gift and for those students who do not have the gift of remembering everything, I want them to be able to know where to find it.” She continued to explain that amount of information in this world is increasing exponentially and students cannot be expected to remember everything. Jody added, “However, it is mandatory that the students know where to get that information when they need it.” She did state that it was important in fifth grade students to remember as much as possible so they would do well on the mandatory state assessments.

- Weak points of lesson: Jody said she could not identify any specific part of the lesson that did not go well. She explained that each year she tries to add to or change her lessons to improve them. She stated that until she participated in the current research project, she did not reflect on her lessons immediately after each lesson was taught.

Chapter Two – Lesson Four. I observed Jody three days after school resumed after the winter break. Lesson four is titled, *Traits and Heredity.*

Lesson reading skill. Jody reviewed the introductory content her students had read the previous day. She directed them to read the first page of the lesson and asked, "What are some inherited traits?" She directed the students to examine the first page to discover the suggested reading skill for the lesson. After one student answered, "facts and opinion," Jody asked her student to define and differentiate fact and opinion. Some students indicated they had talked about fact and opinion in social studies.

Non-technical terms. The class collectively generated the following list of key words that signal a fact: true, fact, as stated, is, was, were and know. The following is the list of key words that signal opinion: I think, I like, I feel, I believe, and my opinion is.

Configurations for reading; reading skill. Jody directed her students to read the following parts of the lesson: main idea statement, the list of vocabulary terms, and the headings and the captions before reading the first two pages of the lesson with a partner. The directions included reading the review and the critical thinking statement at the end of the second page. When the students finished reading the assigned pages, they were directed to develop, with their partner, one opinion and one fact statement. When the students finished reading and writing, Jody called the class back together to discuss all statements. Each pair of students presented their statements which Jody wrote on the white erase board; she asked the students to state if they agreed with the classification and/or wording of each statement. If students disagreed with a statement, they were asked justified their reasoning. The writer of the statement was given the opportunity to edit the statement. For example, one student presented the following statement as a fact. “Catching a ball is an inherited trait.” The students discussed the characteristics of learned and inherited traits after which the student changed his sentence to: “Catching a ball is a learned trait.”

Technical vocabulary. After the class discussion, Jody directed the students to complete vocabulary cards for homework. She told them to write the vocabulary term on one side of the card and the term’s definition on the other side; the students were required to write the definition found in the textbook glossary.

Direct instruction. The following day, Jody collected the vocabulary cards she had assigned as homework the previous day so she could evaluate them. She questioned her students to review the reading skill, fact and opinion. Jody used most of the science class time for direct instruction on dominant and recessive traits. She use examples and drew diagrams on the white erase board to illustrate the succession of dominant and recessive traits when a white pea plant and purple pea plant are crossed and produce offspring. After the direct instruction, the students were directed to read the last three pages of the lesson with their partner.

During the lesson reflection interview, Jody informed me the students reread the lesson as a class to review right before the end-of-lesson test.

Lesson Reflection. The lesson reflection interview was conducted a week after my last classroom observation.

- Textbook reading method: I asked Jody why her students read the science lesson with a partner instead of the format she been following (calling students to read the lesson paragraph by paragraph or round-robin reading.) She answered, "The reason I'm doing that is that now we are starting 2nd semester and this is just one step into independence where I have the kids start to read and I'm trying to give them more responsibility on their own." I asked if partner-reading was a usual practice at the beginning of second semester and she replied, "My feeling is that it is a way of going from teacher dependence to independence and hopefully we'll have more independence next year. But that happens slowly." I encouraged Jody to explain how she helps the students that struggle with reading the science lesson. She answered, "If they are working in groups – one thing I did allow – if we have a reader who is a better reader and one who really has difficulties. It is up to the discretion of the child who has difficulties to decide whether or not he wants to try to read or if he just wants to follow along." Jody accommodates the students who struggle reading the science text by permitting them to work in a group or with a partner.

- Reading comprehension assessment: Since the students had read the lesson with a partner, I wondered how Jody assessed their reading comprehension for this lesson. She explained, “We did, as a review for the text, we did read it a second time together as a class. That’s were some of the terms and that I felt that might have been troublesome to the students, I would explain in more detail.”

- Rhetorical structure and graphic organizer: I asked Jody if she identified a rhetorical structure for lesson four. She stated they worked with fact and opinion. I asked her why she classified *fact and opinion* as a type of rhetorical structure; she amended her statement by saying *fact and opinion* is not a rhetorical structure but a reading skill and she decided to teach it because “I feel it is a very important reading skill that the students need to know or a study skill, more what you would call it. Students need to distinguish what is fact and what is opinion.” I asked Jody if she used a graphic organizer for fact and opinion. When she gave a negative reply, I asked her about an organizer she had drawn on the white erase board. She explained she had used a “T” form where she wrote facts on one side and opinions on the other.

- Technical vocabulary: Jody described the vocabulary cards she utilized in the lesson; the students use the cards to memorize the terms and their definitions. (The students create these cards by writing a term on one side of a card and the term’s glossary definition on the other side of the card.) She explained why she didn’t teach the vocabulary terms before the lesson was read. “We go over the words and then when they come up in the reading – I guess I didn’t do it this time because the students did the reading on their own. They were supposed to read the *Main Idea* [statement] and then go through all the vocabulary words." I asked Jody if there was a possibility some of the students did not follow those directions which would explain why some the students did not have good scores on the vocabulary section on the end-of-lesson test. She replied, "No. I really believe that the reason the students didn't have a good score on the vocabulary is because they didn't study the words."

- Non-technical terms: Jody explained the non-technical terms she taught for lesson two. "We tried to find those kinds of words with the fact-opinion that would signal that this statement was a fact or this statement was an opinion. It was easy to point out the opinion ones. The fact ones were kind of hard unless the documents or the reading said, 'This is a fact.' Then it was hard. With the science book we would assume that most of the material should be fact although we have found a couple of opinions in the book."

- Strong points of lesson: Jody identified the most successful part of the lesson. "I don't know if I can pull anything out. I know that we had some great discussions and I think maybe some of that was pulled out because of the study of fact and opinion. That gave everybody a chance. Everybody has an opinion about what is incorporated in a fact and what is incorporated in an opinion. The other thing I noticed was that was a lot of questioning because this was about heredity and students really kind of got into what it takes to – or what a dominant gene is and how, even though mom and dad have black hair, I come out with blond hair. So they were really interested in that area so a lot of questioning was done. I like that part about the class, too."

- Addendum: I concluded the interview with a comment. I informed Jody she had taught two rhetorical structures with lesson three; the end-of test average for the test was 92% for both sections of fifth graders. A rhetorical structure was not taught for lesson four and the test averages for the sections were 76% and 72%. I told Jody that my comment was "food for thought."

Concluding Interview

Introduction. The purposes of the final interview were to provide the teachers with the opportunity to summarize the new instructional strategies they had implemented since the onset of the study. I wanted to discover the teachers' perceptions of the effects of the newly implemented instructional strategies on their students' science textbook reading achievement. I was also interested in determining the relationship between the workshops and the teachers' beliefs and attitudes towards science textbook reading instruction. I wanted to ascertain why they have constructed these beliefs.

I interviewed Melanie during the 17th week of the study; I interviewed Becky and Jody during the 18th week of the study.

Importance of science textbook reading. I began each interview by asking the teachers to describe the role science textbook reading has in the delivery of science content and student acquisition of key science concepts. Melanie stated all the content she plans on teaching the current year is in the textbook and therefore, science textbook reading, "…all the time" is vital to student success, while other content delivery methods such as videos and hands-on experiences are ways to spark student interest before and/or during textbook reading. “You can hook them in those ways and then take it to the text -- that is sometimes pretty effective with kids.”

In response to the same question, Becky stated, “In our classroom probably 75% of our stuff comes from the text and 25% is hands-on. Their [the students] basic knowledge, the information to even do and understand the labs has to come from the text.”

Jody said, “They [reading and comprehending the science textbook] play a major part because if you can’t comprehend the text or read the text a large percentage of the science knowledge is gone.”

Science curriculum and relationship to text. I wanted to discover how each teacher determined their yearly overall science curriculum and the relationship of their curriculum to the content of the science textbook. Melanie stated she follows the school’s science curriculum which written 2 years before this study. She added the teachers’ selection of the new science textbook was based on the alignment of the textbooks’ content with Riverton’s science curriculum.

Becky, chairman of the school’s science textbook adoption committee, stated she took into account the state science curriculum and standards when she considered science textbook selection. She did not specifically state how she determines her science curriculum but her comments suggest uses the state standards as a guide and the state science curriculum as a model.

Jody stated she follows Riverton's curriculum which is aligned to the state standards. "We have to get through certain materials in order for the students to do well on the test." She continued to explain, "However, the text, in some cases, has to be altered or added to and extra references need to be added to the text so that I can accomplish the first two [Riverton's curriculum and state standards]."

Rhetorical structure, graphic organizer, non-technical terms instruction. Melanie identified four specific rhetorical structures she had taught since the onset of the study: sequence, main idea/detail, cause/effect, and compare contrast. She said that she utilized graphic organizers for all four rhetorical structures and taught non-technical terms associated with each structure; the non-technical terms were written on four respective charts which are displayed in the classroom at all times. She cited incidences where her students had used the non-technical terms on the chart in other areas of the curriculum. "Today, they are doing a research report in writing and one girl was reporting on how paper is made and she used most of those words in a good way." Melanie explained teaching cause and effect was the most challenging; she felt the students didn't have as much prior knowledge for cause and effect as the other structures she taught.

Becky specifically identified two rhetorical structures she had taught: cause/effect and sequencing. She also named predicting. She did not specifically state she used graphic organizers or taught non-technical terms in relation to teaching rhetorical structure. However, when I observed her science textbook lessons, she utilized graphic organizers on multiple occasions for vocabulary learning and organizing textbook content.

Jody identified one rhetorical structure, compare and contrast, stating, "…because that is something students do in other areas as well. They just seem to comprehend that. Also, they are able to pull that out of the book. It makes sense to them." Jody explained she used graphic organizers for some science lessons but she did not grade them. Later on in the interview, she explained she preferred to use organizers (which included key vocabulary terms) at the end of the lesson to summarize.

Reading comprehension measurement post new strategy implementation. Melanie explained she informally assessed her students' science textbook reading comprehension during whole-class discussions and questioning/ answering sessions. She also listened to small group discussions, sometimes just listening, other times interjecting questions. Melanie identified three specific assessments she does each week: (1) vocabulary concept cards, (2) graphic organizer completion, and (3) the summaries the students write. She added the end-of-chapter tests as one of her assessments. In all, she stated that teaching rhetorical structure had a positive effect on the students' ability to read and comprehend their science textbook.

Becky said she measured the success of her students' science textbook reading comprehension by examining the summaries they write. "Yesterday they read about lichens and then they had to write the summary and I really found out today if they knew what they read yesterday by them putting it into their own words and summarizing." Becky explained the experiments conducted by her students "get an assessment of some kind." She accepts drawings made by the students when they write summaries or define vocabulary; they can use pictures instead of writing words. During discussions, Becky explained, “I have a kind of check list of kids that respond and, of course, some respond a lot more than others. Their life experiences cause them to respond more to some things than others. I just make sure that everybody gets called on. And that everybody has a chance to share something.” Becky identified the end-of-chapter test as her formal assessment tool. She explained she used the end-of-lesson test as “a daily dipstick of how the lesson went and what they got out of it. If I see a lot of people that are missing the same thing that kind of tells me – they didn’t get that part- we’d better go back.” (Becky did not provide me with any of the results of the end-of-lesson tests. During my classroom observations, I did not see her teach summary-writing or ask her students to summarize a lesson.)

Jody she measured the success science textbook comprehension with the end-of-lesson and the end-of-chapter tests. She also mentioned the state science assessments which are given in the fifth grade in the spring. Jody described her informal assessment. “You can tell when a child does not understand the material. It could be a quizzical look on their face. Sometimes they come and tell you they just don’t understand. Sometimes they are staring off into space which indicates that they are not with you at all.” She indicated she provided further information through direct instruction for students who did not understand science concepts.

Technical vocabulary instruction. Melanie explained she teaches technical vocabulary in a variety of ways. She requires her students to pronounce the vocabulary word. She also helps her students to make connections between the vocabulary words and their prior experiences. Instruction also includes discussion of the terms and using them in sentences. She said sometimes, they created word webs to clarify science terms. Melanie also taught her students how to create vocabulary concept cards. She said some of her students confused similar vocabulary terms on assessments but “for the most part they understand the words they are expected to know.”

Becky described the science dictionaries her students were creating. They record the vocabulary terms and definitions in separate booklet created for this purpose. The students copy the definitions from the glossary of the science text. Becky stated she utilized the commercially-made vocabulary cards with each science lesson. She described a vocabulary game she creates for some lessons. Utilizing small cards cut from tag board, she writes one vocabulary term per card and the definition for each term per card. She distributes the cards among her students and they match their card to the respective term or definition. This game is used to review the terms and their meanings.

Student-made vocabulary cards were the prominent tool to learn science vocabulary terms in the fifth grade. The students were given several cards cut from tag board; they wrote the vocabulary term on one side and the term’s definition on the other. Jody identified the vocabulary cards and the L to J vocabulary tests as the most successful vocabulary strategies she had implemented. She also indicated she liked the commercially made vocabulary worksheet designed for each lesson. Jody measured the success of the vocabulary strategies by the test scores and the grades on the vocabulary worksheet.

Lesson summary writing. Melanie said she started having her third graders summarize science lessons at the end of chapter four. They continued and have written summaries for all the lessons in chapter five making a total of summary writing for six lessons. She stated that she might not use summary writing with every lesson in the future but did say, “I think it is great----I have seen them [the students] do a lot with their summaries. I really think it forces them to put it into their own words, think about what is important…” She stated she realized summary writing is a developing skill.

During the course of the study, I did not observe Becky teaching summary writing, or requiring her students to write summaries of their science lessons. However, I did observe Becky’s students journaling during science class. Becky explained the journaling. “Usually at the end of a lesson there is a journaling question or a prompt to give to the kids. It’s kind of a mind stretcher. They know the facts, now what would happen if…? It kind of makes them think outside the box because the answers aren’t there and they have to think on their own.” Each chapter has a directed summarizing page.” (The only summarizing page I could locate at the end of the each lesson was in the review section. It did not pose a question but it included three to four sentences that summarized the lesson. I could not locate the specific journaling question or prompt to which she had referred.) Becky explained the students had the choice to work on the journal entry independently or to work collectively with the students in their learning pod. She evaluates their journal entries by giving them a check, check plus or check minus.

Jody explained her fifth graders summarized two lessons; on one of those occasions she let her students use the graphic organizer as an aide. She said in the future she was going to teach her students how to outline a chapter and then use the outline to write a summary. However, she did not plan on using outlines and summaries for every lesson but “occasionally it will give them another insight into how to study for that lesson. Another tool.”

Teacher beliefs about the professional development workshops. Melanie said the workshops were beneficial. “I’ve learned a lot about bringing reading into a content area which I think is so cool to do. When kids hit high school, they really struggle but I don’t think they always have the background to be able to read it on their own and so I really think it has been----I’ve learned a lot about being a reading teacher and a science teacher at the same time. It has been very beneficial to me.” She continued, “If I could keep learning more, I think it would be about helping kids write summaries or maybe even for me to learn to develop good graphic organizers. Anything along the line of what we have done in Chapter Five [of the third grade science text] because I really do feel like it has been successful. The order I’ve done things in. So I guess just the vocabulary, graphic organizers and summary writing – to help kids do all those things independently.” I probed Melanie to explain why she felt implementing the strategies has been successful. She replied, “I feel like I know what is in each lesson a little bit better because I’ve been forced to make the graphic organizer so I feel like I’m teaching it better because I know what’s in it. I’ve looked ahead to break it down in certain ways. I feel like the kids know it better. Today, as my class was finishing this last summary, they would bring it to me and they would say, ‘I don’t think I have enough.’ They would realize on their own that they were missing a whole component that we learned about and

I can't imagine, before doing all this, that they would have even batted an eye at that kind of responsibility for their own comprehension. It's been great."

Becky said the workshops had "reinforced what I thought was proper practice or current practice. Sometimes people will say, 'You just let them read it and do it.' No – so I think you have reinforced some things I've done and made me realize that there is research behind the stuff I do." She suggested a missing component from the workshop were ideas or tools to make science textbook reading important to all students of varying abilities.

Jody was hesitant at first to comment on her beliefs about the workshops. After a prod, she said, "A suggestion would be not to do it [graphic organizer construction] on a page by page basis. I personally, my favorite way of using graphic organizers', depending upon what you are looking for, but my favorite way is to use it as a summary of the lesson rather than as a worksheet for the lesson or a page by page job for the students to do." I wanted to discover if she had tried implementing graphic organizers after the students read the lesson. She said, "I have. I like the one where it becomes the summary of the lesson. Okay. You have it and then as a review of the lesson, you fill it out as a class. Then the kids, at least have the right information in there. That was something that I found there was a little bit – it was difficult because some of the students who didn't really understand were just pulling out information and plugging it in and it didn't always fit in the right area." She continued to explain she felt it was most effective when her students collectively completed the graphic organizers. "…so that they were sure to get the information in the right area and use it as a review of the lesson rather than as a worksheet as we go though the lesson."

Quantitative Data Results

The quantitative data collection for this study was limited to the results of the assessment of informational text pedagogical knowledge administered to the three teachers during the first week of the study and again during the 18^{th} week of the study. The small number of teachers (n=3) who participated in the study limits analysis of the assessment to descriptive statistics.

Rationale. Research results indicate that students, beginning in the primary grades, are minimally exposed to informational text and comprehension strategy instruction (Duke, 2000). Plausible causes for the absence of information text reading instruction is the teacher belief that narrative is "primary" (Pappas, 1993), children are not capable of reading and writing informational text (Casbergue & Plauché, 2003; Kamil, 1994), and the lack of availability of informational text in the classroom setting. For this study, I explored another plausible explanation - absence of teacher knowledge of the fundamentals of informational text reading instruction.

One purpose of professional development is to provide opportunities for the participants to gain pedagogical knowledge that supports understanding of the instructional practices presented in the workshop (Guskey, 1986). To measure the teachers' growth of informational text and related instructional strategies, I administered a pre-and post-informational text pedagogical knowledge assessment (See Appendix C). The assessment measured the teachers' knowledge of: (a) the purposes of reading informational text, (b) the structures in which informational text is written, (c) non-technical terms that signal rhetorical structure, (d) graphic organizers and how they facilitate student comprehension and summarization of informational text, and (e) strategies that facilitate informational text vocabulary instruction. See Table 4.2 for the distribution of the value of points across all nine questions on the assessment.

Table 4.2

Distributions of Point Values across the Pedagogical Knowledge Assessment

Question Topic	Number of Questions	Total Point Value
Purpose of informational text	1	1
Organization of informational text	2	10
Non-technical terms	2	6
Graphic organizers	2	10
Graphic organizers as summarization aids	1	5
Vocabulary instructional strategies	1	5
Total	9	37

Descriptive Statistics Results

Methodology. Each question had a different scoring value. Questions that elicited one specific answer that was either correct or incorrect had a scoring value of 1 point. Questions that elicited multiple answers such as naming multiple ways informational text can be organized had a higher scoring value, e.g. 5 points. The points earned on all questions for each teacher were divided by the total possible points to determine a percentage of points earned for each assessment. I calculated the average of the total number of points earned by each of the three teachers on the pretest and on the posttest. The results follow.

Pre-and post-test results. The pre-and post-assessment results were compared across the three teachers in their percentage of correct responses and their test score averages as compared to the overall test average.

Percentage of correct responses. The pre- and post-test results indicating the percent of correct responses follow: (a) Melanie: 31% pre-test and 71% post-test, (b) Becky: 29% pre-test and 52% post-test, and (c) Jody: 23% pre- test and 58% post-test (see Figure 4.17)

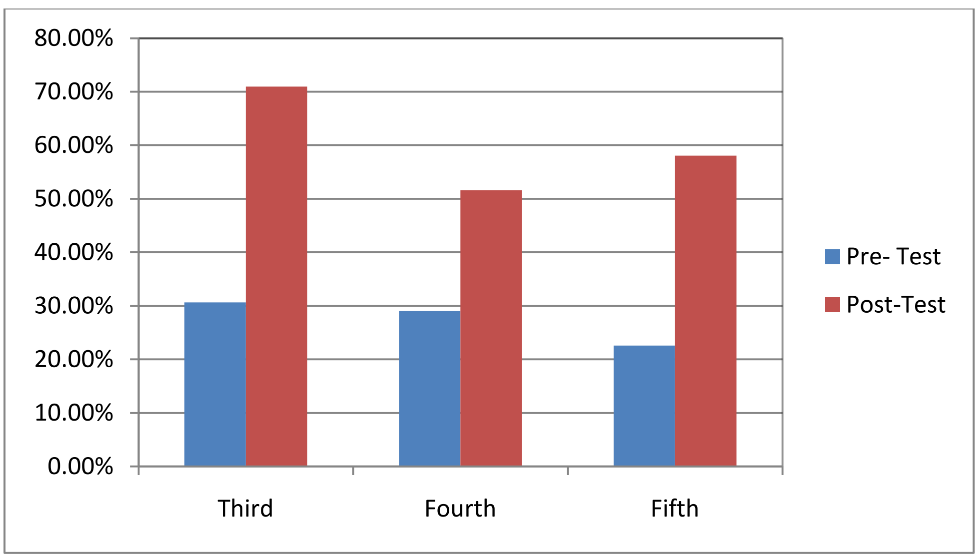


Figure 4.17 Results for Informational Text Pedagogical Knowledge Assessment

Pre-test and post-test averages. The pre-test average for all questions was 8 points out of 37 possible points. Melanie and Becky's pre-test mean scores exceeded the overall test mean: Melanie 9.3 points, Becky 9 points. Jody's pre-test mean, 7 points, fell behind the overall mean. The post-test mean for all questions was 19 points out of 37 possible points. Melanie post-test mean score (22 points), surpassed the overall mean, while Becky's (16 points) and Jody's mean (18 points) fell short of it (see Figure 4.18**).**

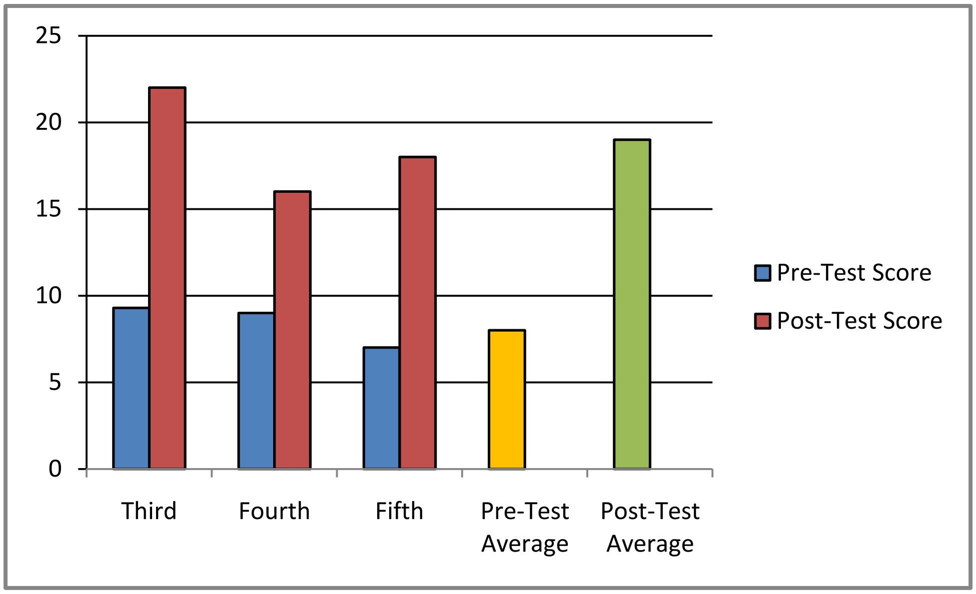


Figure 4.18 Comparisons of Mean Scores

Areas of minimal growth. Table 4.3 offers the percentages earned for each session of the pre-and posttests for each teacher. When comparing pre- and posttest scores across questions, both Melanie and Becky did not show growth in knowledge in the description, use and purpose of graphic organizers. Melanie's test responses indicated she did not understand the rhetorical structures of informational text while the results of Becky's tests indicate she does not have a clear understanding of instructional strategies that facilitate students' comprehension of vocabulary terms found in their science textbook. Jody's test results showed growth in knowledge in all categories of the assessment.

Table 4.3

Areas of Minimal Growth Indicated by Test Scores

Melanie									
Question	1	2	3	4	4a	5	5a	5b	6
Pre	100%	67%	30%	50%	0%	33%	33%	0%	25%
Post	100%	33%	80%	100%	100%	0%	50%	100%	100%
Becky									
Pre	100%	33%	0%	0%	0%	67%	33%	0%	75%
Post	100%	33%	60%	100%	100%	0%	33%	67%	25%
Jody									
Pre	100%	33%	0%	0%	0%	33%	33%	33%	25%
Post	100%	67%	80%	100%	100%	33%	33%	33%	25%

Note. Post-test scores that were lower than pre-test scores are highlighted.

Assessment questions:

1. What is the purpose of reading informational text?
2. How is information in expository (informational text) organized?
3. Name and describe the different ways informational text can be organized.
4. What is the function of non-technical vocabulary in informational text?
    a. Give examples of non-technical vocabulary.
5. What are graphic organizers?
    a. Explain how graphic organizers facilitate students' comprehension of informational text.
    b. Explain how graphic organizers can facilitate students' summarization of informational text.
6. Describe instructional strategies that facilitate students' comprehension of vocabulary terms found in their science textbook.

The relationship between the qualitative and quantitative results are discussed and analyzed in chapter five.

Chapter Five

Discussion

The focus of this study was to examine the relationship between the potential change in three teachers' instructional strategy implementation and professional development workshops that presented instructional strategies to facilitate students' science textbook reading comprehension. I was interested in discovering the degree of anticipated change by examining the quality and quantity of new strategy implementation within and across the three participants. Guskey's (1986) model for professional development and teacher-change is the theoretical foundation for this case study. Guskey states that high quality staff development is a central component in most proposals for improving education. In his view, real change in teacher narrative is based on the idea that change is a learning process for teachers that is developmental and experientially based. His theory describes the change components in the following order:
(a) the teacher implements new instructional strategies over time, (b) student achievement increases, and (c) change in teacher-beliefs and attitudes toward strategy implementation results. Teachers are motivated by student performance and engagement, (Richardson, 1990) and change in teacher beliefs result in change in classroom practices (Broaddus & Bloodgood, 1999).

My three qualitative research questions align with Guskey's theory for the progression of teacher change: (a) What is the relationship between change in teacher instructional strategies for science textbook reading and the professional development workshops? (b) What are the teachers' perceptions of student achievement as a result of new strategy implementation? and (c) What is the relationship between the teachers' perceptions of student achievement change and the teachers' attitudes and beliefs towards new strategy implementation? As I examined the data for answers to these questions, three significant differences among the teachers emerged: (a) teaching experience, (b) teacher self-perceptions, and (c) delivery of science content. These differences emerged as explanations for the difference in the quantity and quality of strategy implementation among the three teachers following each professional development session.

The analysis suggests the degree of teacher change is related to several inner-related factors. The teachers with the most teaching experience and strong science teacher self-perceptions had developed specific practices to deliver science content. Their established practices were reinforced by their perceptions of student achievement. Therefore, they were reluctant to implement the instructional strategies presented in the professional development workshops. The teacher with only a few years of teaching experience, and a teacher self-perception encompassing the full curriculum and few instructional strategies in place implemented the all the workshop strategies.

Model of Teacher Change

The data from this research supports a relationship between teacher-change and the length of teaching experience and teacher self-perception with mode of content delivery, student assessment, and teacher beliefs (See Figure 5.1). Teacher change is influenced by the teacher's amount of experience. As a teacher gains more classroom experience, she gains a greater depth of domain and pedagogical knowledge, develops confidence in her instructional strategies, and the capacity to respond to instructional problems (Alexander & Fives (2000). The teacher also develops motivation, which includes interests, goals and self- beliefs. She builds a perception of “self” over time. Through experience, a combination of knowledge and motivation influence the teacher’s mode of content delivery; she adopts instructional practices which yield student academic success (Guskey, 1986). Student-success in relation to a method of content delivery facilitates the development of teacher beliefs about the content delivery which includes instructional practices. Changing long-term practices that have been reinforced by student achievement is a challenging process that could take two to three years before they become evident in the classroom (Guskey, 2002). If the teacher perceives high student success, she does not see the need to change the instructional practices.

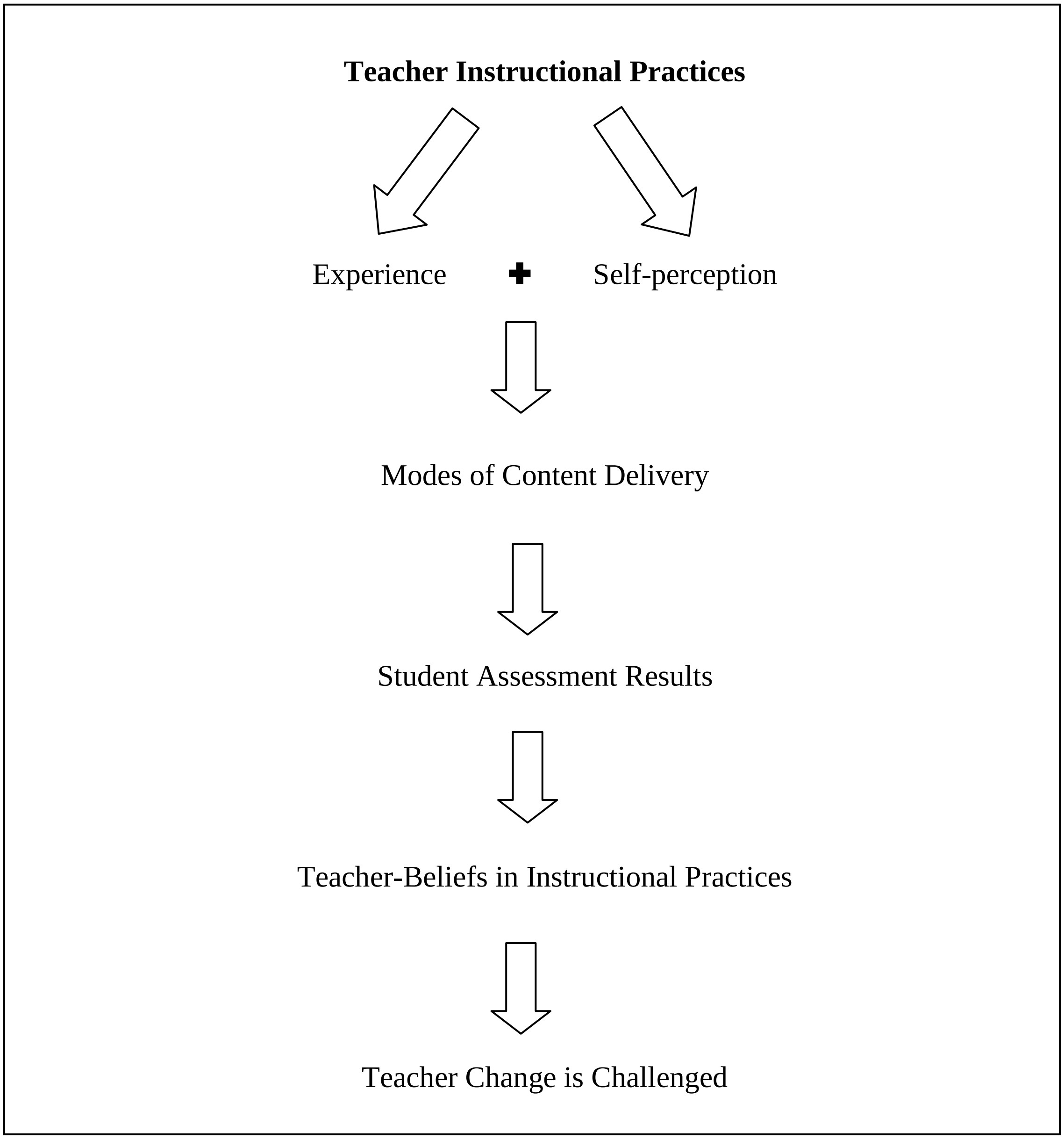


Figure 5.1. Model of Teacher Change

Although the three teachers in this study implemented instructional strategies presented in the workshops, the quality and quantity of implementation varied greatly. The following discussion examines the teachers’ differences in new strategy implementation, related perceptions of student achievement, and consequent beliefs and attitudes towards the new strategies in relation to the framework of the three emerging themes.

Emerging Themes

Introduction. I discuss plausible explanations for the differences between teacher-change across the three teachers within and across three central themes that emerged in the data analysis. The themes are separate, yet inextricably interwoven. It is challenging to separate the three. However, teaching experience is the first construct to examine, with teaching experience, teacher self-perception and content delivery methodology subsequently developing over time.

Alexander and Fives (2000) state teachers who are striving to become experts, increase their knowledge (domain and pedagogical), build their motivation (interests, goals and self-beliefs) and develop strategic processing (response to various instructional problems). These fundamentals are developed during three stages over a period of time: acclimation, competency and proficiency (Alexander & Fives, 2000). The beginning stage, acclimation, is a period of orientation to the educational process. Domain and pedagogical knowledge are limited, goals and self-beliefs are developing and strategic processing is limited due to the lack of experience in making instructional decisions. Teachers in the competent stage of development possess “rich knowledge about teaching, human development, and they have an extensive repertoire of instructional strategies…” (Alexander & Fives, 2000 p. 296). Competent teachers have a balance between routine and creativity. Proficient teachers have the characteristics of competent teachers but they are able to take their skills a step further by communicating their knowledge of the educational process to others.

Teaching experience as related to teacher-change. Examining the teaching experience of the three teachers in this study in relation to Alexander and Fives's (2000) continuum, we can better understand their teaching developmental differences, specifically in science knowledge and science pedagogical knowledge they have acquired, goals and self-beliefs they have developed as a result of their science teaching experience, and their growth in responding to educational problems and situations over time. The variations in the teachers' development of these constructs, in turn, lead to differences in their self-perceptions, and delivery of science content.

Two of the teachers are veteran teachers with 36 years and 24 years of teaching experience. Both teachers have a keen interest in science and had years to develop materials for a science curriculum and methods for content delivery. One of them had accumulated significant amount of science equipment which she used on numerable occasions during the study. She also conducted numerous experiments and/or used other hands-on activities she had developed over the years. The other teacher, with the state assessments in mind, had gathered a variety of science reading material to supplement the textbook. She also had developed hands-on activities. To facilitate student recall of content, she had created a variety of web organizers from prior science lessons which she altered to fit the lessons in the new science textbook. Over the years, both teachers had acquired a great deal of science knowledge which facilitated their direct teaching, classroom discussions, and the development of experiments and hands-on activities. They were able to elaborate on topics presented in the text, providing their students with the opportunity to expand their science knowledge beyond what they read in the science textbook.

Both of these teachers fall in the area of competency on Alexander and Fives's (2000) continuum because they are experienced teachers and have acquired science and pedagogical knowledge they practiced and repeated over time. They believed their students learned content with their instructional practices, which supported their beliefs in the success of these practices, thus providing the impetus to continue their utilization. Their strategies in place were so well ingrained that they chose to implement only a few of the workshop strategies.

The instructional practices that these two teachers repeated over time and perceived to be successful and related to student achievement became "cemented" in their repertoire of strategies. For example, both teachers had strong beliefs about their students' ability to learn science technical vocabulary through rote learning. One of the teacher's vocabulary strategies did not vary from the traditional method of writing the glossary definition of the term and memorizing terms and their meanings with the use of flash cards. Her practices in technical term instruction were founded on the belief that the science textbook contains many technical terms making it harder for the students to read narrative text. This notion is supported by Harmon, Hedrick, and Wood (2005) who state technical vocabulary raises the readability level of informational text and often impedes comprehension. However, her practices and beliefs that developed over time discounted her implementation of the vocabulary strategies presented in the workshops. She also chose not to teach vocabulary strategies as part of a package of strategies to facilitate reading comprehension. Instead, she continued to teach vocabulary with drill and practice exercises, a method she believed to be successful in the past. This notion is supported by Guskey (1986) who states teachers' beliefs in the success of instructional practices are reinforced by positive student achievement.

The third teacher, on the other hand was a "clean slate." At the beginning of the study, she was in her fourth year of teaching and was at the acclimation developmental stage on Alexander and Fives's (2000) continuum. She was building knowledge, exploring her beliefs and attitudes towards instructional practices, and demonstrating few strategic processes in science textbook reading instruction. She had not the experience or time to develop a vast array of supplemental materials, hands-on activities or instructional strategies for her science lessons or to acquire extensive domain and pedagogical knowledge. She was in the process of being oriented to a complex field (Alexander & Fives, 2000) of making numerous educational decisions about instruction, curriculum, discipline, and class organization. During baseline observations, she implemented few specific strategies during science textbook reading instruction. She may have experienced success in terms of student achievement with these practices. However, one characteristic of teachers in the acclimation stage of development is inefficient strategy use and wavering confidence (Alexander & Fives, 2000). It reasonable to believe she realized she could improve her selection and implementation science reading strategies. She had not had the time to develop positive beliefs and attitudes towards her current strategy implementation which left her more amenable to try new ideas.

Teacher self-perception as related to teacher-change. The three teachers in this study perceived themselves differently as science teachers. Their perceptions are directly linked to their teaching experience. Teaching competency develops over time and is hallmarked by a rich repertoire of teaching strategies, extensive domain knowledge, and knowledge about human development that result from repeated practice (Alexander & Fives, 2000). A perception of competency directs the teachers' choices in instructional practices. They choose instructional practices that they value due to previous student achievement (Guskey, 1986). A teacher's self-perception of competency drives their delivery of content.

One teacher's instructional practices and classroom atmosphere suggest she perceived herself as a science teacher. She has been a recognized leader in science education in the state for numerous years. Her vitae include lists of numerous professional science experiences and honors. While the study was being conducted, she was absent from school to attend science workshops on two different occasions. The numerous science artifacts in her classroom such as the snake skins hanging from a cupboard, aquariums that housed mealy worms, lizards and hermit crabs and the numerous hands-on activities support her commitment and interest in teaching science. Science is a major part of her overall curriculum. She commented during the baseline interview that she taught science all day long.

It is reasonable to believe that this teachers' perception of herself as a teacher of science was the impetus for her decision to deliver science content through multiple methods other than just reading the textbook. The nature of the study of science is suitable for experimenting and observing to learn scientific concepts. Even though the science textbook was read aloud in the classroom and was the basis for the topics in the curriculum, she delivered most of the content through hands-on activities, direct instruction, and personal narratives. She saw herself as a teacher of science, not science reading, and therefore it is reasonable to believe that this is why she did not readily implement the science reading instructional strategies presented in the workshop.

The second teachers' instructional focus was science. Two-thirds of her teaching load was science. She was chairman of the school district's science fair during the year of this study. She stated that her love for teaching science began during the first three years she taught school when she was responsible for teaching science to all fourth, fifth and sixth grade students. The state standards science assessment is administered in the spring to fifth graders only, and she felt it was her responsibility to prepare her fifth grade students. She knew every question on the state assessment and the assessment was the basis for the design and content of her science curriculum. Her knowledge of the state assessment content facilitates her preparing her students for the test. She knows the content to teach in order for them to do well on the test. However, this knowledge restricted her instructional practices. She encouraged her students to memorize facts which narrowed the opportunities for them to develop deep and broad understandings of the science concepts. In a reflection interview, she stated it was important for her fifth graders to remember as much as possible because of the mandatory state assessments.

She vested herself in the responsibility of preparing her students for the state test. Her self-perception of being the "responsible one" was the impetus for the formation of her task-oriented curriculum. The method she utilized to achieve her goals was direct instruction. She sorted out and organized the facts in the text for her students instead of teaching them strategies so they could independently determine a text's key concepts and the relationships among them, a key strategy in comprehending informational text (Merkley & Jefferies, 2000). Prior to the study, her students had been successful in recalling the key concepts that she had filtered out of the text and presented to them. Her instructional practice did not include releasing the responsibility of strategy selection to her students, (Pearson & Gallagher, 1983) and therefore, she did not embrace the package of workshop instructional strategies which utilized metacognitive processes that promote strategic readers who are self-regulated science learners.

The third teacher's self-perception of being a teacher of science differed from the others. Her comments and actions suggest she did not consider science a major emphasis in her overall curriculum other than being responsible for teaching the two third-grade science classes. She taught multiple subjects a day and science was one of them. At the beginning of the study, her science reading instruction included few strategies. She taught each lesson in a similar manner with little opportunity to broaden the curriculum. It is reasonable to believe that her self- perception of being a "teacher of all" combined with her lack of teaching experience enabled her to be receptive to new instructional strategies.

Delivery of science content as related to teacher-change. The more teaching experience a teacher has, the more opportunity she has to develop a repertoire of instructional practices through repeated practice, developing beliefs and goals concerning those practices (Alexander & Fives, 2000). The teacher sifts through instructional practices, selecting ones she deems successful in terms of student achievement (Guskey, 1986). A discussion of the change in the teachers' methods of science content delivery in relationship to teaching experience and self-perceptions follows.

The teacher who perceived herself as an expert science teacher did not rely on science textbook reading to deliver content. She stated more than once that she did not believe her fourth graders were capable of reading the science text, and since she did not implement many of the reading strategies presented in the workshop, it is reasonable she did not see the value in the strategies as science learning aides for her students. While observing her science lessons, she omitted reading pages in the textbook lesson. She delivered the content through direct instruction instead of directing her students to read the pages. She held the belief in the importance of connecting science directly to the "real" world and her science content delivery reflected this belief. She integrated numerous hands-on activities throughout the study, encouraging her students to observe, discuss and record the results of the experiments, all acts of a real scientist.

During most of the lessons I observed, she delivered content through detailed personal narratives that connected the content of the lesson with events in her life or the lives of her students. Her mode of content delivery aligns with the findings of Jetton and Alexander (1997) who suggests that teachers with high domain knowledge rely on their prior knowledge to transmit knowledge.

In contrast, the science fair coordinator's curriculum was driven by the questions on the state standards science assessments for fifth grade. She utilized textbook content for most of her curriculum and supplemented with other reading materials for content not in the text but assessed on the state tests. She provided extensive direct instruction to clarify complex concepts during textbook reading and utilized hands-on activities to provide additional learning experiences for her students. However, her practices did not move the students towards independence in reading the science text. Like the science expert, this teacher's mode of content delivery aligns with Jetton and Alexander's (1997) research which indicates teachers with high domain knowledge rely on prior knowledge and other reading artifacts to deliver content. She expected her students to learn explicit knowledge by memorizing specific science facts including vocabulary terms and their textbook definitions. She used drill and practice to facilitate her students' memorization and they were tested on the memorized content. Therefore, her test results support her methods of content delivery. She did not facilitate her students making connections between concepts in other contexts therefore limiting their breadth of knowledge (Shell, et al., 2010).

The novice teacher's primary source for content delivery was reading and discussing the science textbook. Her students' success in understanding and remembering science content mainly depended upon their ability to read and comprehend the text.

Implementation of New Strategies

The following discussion focuses on the change in the three teacher's delivery of content in relation to teaching the reading strategies presented in the workshops.

Duffy's (1993) work on strategy instruction support and complement Guskey's (1986) theory. First, Duffy's (1993) research tracked and rated on a continuum, the change in teachers incorporating new strategies into their daily practices. He found consistencies of teacher characteristics that developed while the teachers implemented new reading strategies. Teachers gained professional knowledge about reading research on strategies, philosophies, and practices during monthly staff development meetings, and the teachers were encouraged to adapt materials and techniques to their needs. Only the achievement of at-risk students was tracked. The current study differs from Duffy's (1993) study in that the teachers in the present study were given a set of instructional strategies in the workshops to implement and the success of all students' science reading was tracked by each teacher. Since both studies examine teacher-change in implementing reading strategies, Duffy's (1993) continuum of teacher-characteristics can be utilized to compare the change in instructional practices among the three teachers in the present study. In review, Duffy's (1993) nine-point continuum is: (1) confusion and rejection, (2) teacher controls the strategy, (3) trying out, (4) modeling process into change, (5) the wall, (6) over the hump, (7) I don't quite get it yet, (8) creative-inventive, and (9) unnamed.

The expert science teacher and the science fair coordinator. The expert science teacher and the science fair coordinator implemented the instructional strategies presented in the workshops to a small degree. The strategies they did implement were ones familiar to them. In previous workshops they learned the strategy, compare/contrast in narrative texts. They were comfortable in utilizing the concept of compare/contrast to teach science concepts but they did not connect the strategy to science textbook reading. They assumed their students would transfer their knowledge of this structure to science reading without further instruction The science expert did not teach the compare/contrast non-technical vocabulary but the science coordinator did review the terms with her students prior to textbook reading. Both teachers implemented compare/contrast graphic organizers they had used either for narrative text or in previous science lessons.

Unlike the science expert, the science fair coordinator did implement each strategy once and the implementation followed the order of the workshops. Neither teacher implemented a package of strategies as I requested. Even though these two teachers were similar in their reluctance to implement the workshop strategies, they differed in their content delivery practices. Their practices were driven by their differing beliefs and goals for student learning. The discussion on these differences follows.

The science expert implemented two vocabulary strategies and utilized several graphic organizer configurations but was inconsistent in implementing the strategies across all science lessons and in following the progression of the strategy implementation presented in the workshops. I would characterize her instructional practices throughout the study as point one on Duffy's (1998) continuum. She did not move beyond the point of "confusion and rejection." Teachers characterized by point one do not create new instructional programs by changing "classroom patterns, routines and rituals" (Duffy, 1998 p. 113). Some of this teacher's statements throughout the study provide a window of explanation why she did not implement all of the workshop strategies.

This teacher's comments during lesson reflections concerning strategies she had not implemented were confusing when considering some of her answers outside the context of the interview questions. Her varied responses about specific strategy implementation suggest she was circumventing the issue at hand. For example, on a written lesson reflection, she responded to the question that asked her to identify the non-technical terms she taught, “We have discussed it previously in reading group, so it was a natural flow with some real world applications!” Her statement suggests she believed her students would transfer their previous learning about non-technical terms in reading group to science textbook reading. Consequently, she did not reteach or review the strategy or instruct her students how to apply the strategy in other contexts. For another example, she stated the rhetorical structure she had taught was compare/contrast because “it was a good way to teach about invertebrates.” She did not identify or teach the rhetorical structure of the actual text in the lesson. Instead, she utilized the compare/contrast concept to convey text content. Even though, comparing and contrasting vertebrates with invertebrates provides the students with the opportunity to conceptualize the concepts in depth, science textbook reading comprehension is not facilitated when the students are not taught to recognize the structure of the science textbook. Informational text is written in a complex organization of concepts arranged in a specific configuration such as compare and contrast. Understanding the organization of the textbook concepts and their relationship to each other supports overall comprehension and recall (Armbruster, Anderson, & Ostertag, 1987).

The expert science teacher made belief statements that directly contradicted her actions. Even though she implemented few of the workshop strategies, she stated in an interview she thought the strategies were going to be beneficial for the subsequent year of school. She felt the strategies were important and in the following year, she would benefit from the students’ previous instruction in science reading strategies because she would only need to review them. Hilden and Pressley (2007) found some teachers participating in professional development workshops believed they already knew everything they needed to know about how to be a successful teacher of comprehension strategies. The expert science teacher shared similar beliefs. During the final interview she stated the workshops, “reinforced what I thought was proper practice or current practice - made me realize there is research behind all of this stuff I do.” This statement suggests she believed the workshop strategies aligned with strategies she already had in place and had implemented prior to and throughout the study.

The science fair coordinator tried the strategies presented in the workshops once. I would characterize her instructional practices throughout the study as moving back and forth between point one, “confusion and rejection” and point two, “teacher controls the strategy” on Duffy’s (1998) continuum. She selected a specific strategy from the package and taught it once (point two) and then returned to her former practices and methods (point one).

Like the expert science teacher, the workshop strategies the science coordinator selected to implement were ones she knew her students had learned in previous grades such as sequencing, were strategies she had learned and implemented for narrative text reading, or were strategies she had used previously and experienced success, such as utilizing graphic organizers as a review. For example, she reviewed both compare/contrast structure and sequencing with her students prior to textbook reading. Both she and her students were familiar with the structures in narrative text and with her guidance the students were able to compare/contrast and sequence key concepts in the appropriate science textbook lessons. She had utilized graphic organizers prior to the study and believed them to be a positive learning strategy because her former students learned to utilize organizers to learn science content and were successful as measured by textbook-generated and standardized tests, a notion supported by Guskey (1986) and Richardson (1990) who state teachers believe strategies are successful in terms of their students' achievement. When she tried implementing workshop strategies new to her, such as *Possible Sentences* (Stahl & Kapinus, 1991) and vocabulary concept cards, (Moje,1996), it was during classes I was observing.

When the science coordinator did try a workshop strategy, her instructional practice could be characterized by point two on Duffy's (1993) continuum, "teacher controls the strategy." She did the thinking about strategy selection and implementation for her students while her students focused on answering her questions. Her students were not aware she was teaching them a strategy they could implement independently or understand why implementing the strategy would facilitate their comprehension of the textbook reading lesson. This practice is contrary to Hilden's and Pressley's (2007) theory of transactional strategy instruction which states teacher explanations and modeling of comprehension strategies are crucial for the development of self-regulated readers

Rhetorical structure. The expert science teacher struggled in connecting rhetorical structure with the textbook. She wrote in a lesson reflection that she had taught cause/effect because it was a "perfect fit into why some seeds grew and some didn't." She had taught the concept of cause/effect through a hands-on activity. She understood how to relate cause/effect with tangible objects, but she couldn't yet recognize cause/effect in textbook structure. On another occasion, she utilized a Venn diagram and in her lesson reflection she stated she had taught the rhetorical structure, compare/contrast. Her statement suggests she believed by using a Venn diagram to compare and contrast key concepts, she was making connections to the inherent and expected structure of the text. She was comfortable in utilizing the concept of compare/contrast because she had taught it with narrative text. Also, she had a strong understanding that comparing and contrasting is suitable to the nature of science content.

Another comment that exemplified the expert science teacher's confusion about text structure was made during the second interview. She said she gave her students "license to pick a structure that they want to use." This was an ineffective instructional choice, because the rhetorical structure of expository text is the format in which the author writes to best convey relationships across ideas and concepts (Merkley & Jefferies, 2000). It is not a format assigned to the text by students. If students are permitted to select any rhetorical structure they want to use, relationships among concepts in the text may become misconstrued, important concepts may not be filtered out of the text, and the concepts of the text may not be reorganized in a pattern that conveys meaning central for comprehension and recall.

When I asked the expert science teacher to describe the degree of ease she had in identifying a lesson's rhetorical structure, she replied, "My book is pretty good about giving me what they want to use. If I agree with them, we do it and if not, I just – maybe there is one we are talking about in reading that I think, 'Oh this will work here, too.' It doesn't bother me. I'll use the one in the book if need be. Otherwise I'll substitute something I think they [the students] understand that will work just as well with what we are doing." Her statement suggests she confused the reading "skill" which the student textbook suggests for each lesson with the actual rhetorical structure in which the text is written. (The textbook company provides a strategy suggestion for each lesson which they have inappropriately labeled as a "skill.") Duffy (1998) found teachers who were unable to move beyond point one on his continuum felt they should not "wrest away instructional control from the basal text," p. 113. These teachers relied on directives from the teachers' manuals instead of applying their knowledge to create instructional programs. Her statement also suggests she thought rhetorical structure could be selected and applied to the text, instead of recognizing that the inherent text composition dictates its structure.

Similar to the science expert, the science coordinator did not fully understand rhetorical structure. She stated she did not pre-examine the text to determine the rhetorical structure. Her main concern was in filtering out the facts and teaching them to her students. Instead of teaching instructional strategies that support generalized science textbook comprehension, the impetus of her science lessons was to deliver content facts for her students to learn for the state test– a characteristic of her instructional practices.

Her focus of teaching the main concepts of the lesson by filtering out irrelevant information is supported by research studies. Alvermann and Boothby (1983) found students who received training in comprehension strategies that facilitate sifting out irrelevant information in expository text recalled three times as many relevant unit ideas as the control subjects. However, this teacher identified the main ideas instead of teaching her students strategies so they could identify and organize the key concepts found in their science textbook lessons. This is another example of her instructional methodologies that fall on point two of Duffy's (1993) continuum; she did the generative thinking while her students were passive participants. The purpose method of content delivery was to teach her students the science facts they would need to know for the state science test in the spring. Her goals did not include teaching her students to learn concepts in depth and her instruction did not facilitate her students making connections across concepts or similar concepts in other contexts.

Non-technical terms. Since both teachers did not teach rhetorical structure, it is congruent that they did not teach the related non-technical terms.

Technical vocabulary. Throughout the study, the science fair coordinator required her students to provide glossary definitions when they defined terms. She did not move beyond the textbook definition to encourage her students to apply the meaning of the term by using it within the context of a sentence. When students memorize, they repeatedly practice or rehearse concepts which eventually is stored in their long-term memory to be retrieved at a later time. The deficit in rote memorization is strategy learning is usually omitted and students are not provided with opportunities to make connections of the information in other contexts (Shell, et al., 2010 p. 24). The results of vocabulary research studies, (e.g., Readence, Bean, & Baldwin, 2000; Stahl, 1986) indicate vocabulary learning requires multiple exposures over an extended period of time as opposed to rote learning. Contrary to these findings, this teacher assumed the students would transfer the book definition in applying the meaning in other contexts. It appears she was not comfortable with her students moving beyond the textbook definition to explore the vocabulary terms in multiple contexts. By not teaching them to think about where the word does not fit, she was limiting the growth in their precise use of the words. Her belief in the transfer of knowledge after memorizing the definitions of vocabulary terms was strong and was reinforced by her methods of vocabulary assessment.

The science expert also required her students to define technical terms with glossary definitions. She engaged her students in drill and practice exercises with vocabulary flashcards to encourage their memorization of the terms. However, in contrast to the science fair coordinator, she also provided opportunities for her students to apply the terms in other contexts such as in describing projects or experiment results which promoted breadth of understanding (Harmon, Hedrick & Wood, 2005; Stahl, 1986; Yopp, R. & Yopp, H., 2004)

Graphic organizers. The expert science teacher utilized graphic organizers on several occasions but did not connect the organizers to the rhetorical structure of the science textbook lesson. She utilized a compare/contrast matrix that I provided her after I had observed her struggling with rhetorical structure identification and graphic organizer choice. After utilizing the matrix, she stated she believed it helped students understand what they were reading by giving them a way to organize the content. This positive experience with a matrix organizer encouraged her to create and implement other compare/contrast matrices on other subsequent occasions. However, she did not provide instruction in explicit connections between the graphic organizers and the rhetorical structure of the text. She did not tell the students why a specific organizer was being used. Unlike the novice teacher, she did not express a belief about the importance of graphic organizer alignment with the text structure nor did she practice the strategy of alignment. Since she did not teach the rhetorical structure of the lessons, it follows that she did not attempt to align the organizers with the structure. Once again, her belief that her students were not capable of reading the textbook would support her reluctance to teach the relationship between a graphic organizer and the structure of the text which contained the information to be written in the organizer.

She did not model how the key concepts from the text could be organized in a matrix to clarify comprehension. Instead, she connected the matrixes to the textbook by directing her students to the pages in the textbook where the first several answers for the matrix could be found, after which the students were expected to finish the organizer independently. Later, she stated she was surprised the students had no idea the information needed to complete the matrix was in the science textbook. She recognized her students did not possess the strategies to read informational text or had received instruction to “read like this or look for answers.” She was aware her fourth grade students had not been taught how to locate information in informational text but she did not recognize that she had not provided them with the tools to complete the research task; she showed them how to do one, therefore they should be able to finish the assignment independently. She believed in the transfer of skills after minimal practice. Her actions combined with her statements suggest she did not understand instruction goes beyond modeling. Effective strategy learning includes multiple exposures with guidance and the teacher gradually releasing the control of strategy implementation to the students (Pearson & Gallagher, 1983).

The science fair coordinator believed organizers functioned best as a review of the text and were most effective when completed after reading. This belief is support by Moore and Readence's (1984) meta-analysis that found graphic organizers completed post-reading yielded a medium effect size (.57). She also stated organizers can serve as a study guide and they aid in recall of important information. She recognized the important purpose of organizers is to visually organize key concepts, and she understood their role in recall of relevant information in text. However, she did not implement instructional strategies that facilitated her students' understanding of the relationship between organizers and the structure of the text. Her instructional focus was facilitating her students' recall of facts; she did the work for the students by filtering out the relevant information. She did not teach her students this strategy to facilitate their independent science textbook reading. She required her students to complete the organizers, but she did not teach them the relationship between the text and organizer and why this connection was important.

Summarizing. Even though I did not observe the science expert teaching summarizing, she did provide me with examples of her students' summaries of science lessons. They were primarily key technical terms and their textbook definition. This teacher stated during an interview that definitions and illustrations were acceptable in writing summaries. This teacher permitted her students to write a summary with a partner. Summarization of content area material indicates the student has understood the material not just recalled isolated facts (Alvermann & Boothby, 1983). If summaries are collectively written by several students, it is difficult to determine to what degree each of them comprehended the material they summarized making assessment more problematic.

In contrast to the expert science teacher, the science fair coordinator instructed her students to summarize a science lesson but they were not permitted to use any references such as the text, notes or graphic organizers. Their summaries were composed from concepts they remembered. She stated her students had already learned how to summarize so she didn’t see the point in giving additional instruction. Mastropieri, Scruggs and Graetz’s (2003) review of reading comprehension instruction research found summarization is an essential skill for recall and comprehension. However, this teacher’s instruction and directives did not include strategies for summary writing to facilitate her students filtering out the relevant information from the text and organizing it into cohesive paragraph that restates the key concepts of the lesson. She perceived summarization as a skill to learn but did not apply it as a tool for comprehension and recall.

Her absence from the last workshop is a plausible explanation for her utilizing summarization only once. (Summarizing with the use graphic organizers that pertained to the structures of the text was the only strategy taught in the last workshop.) However, trying a strategy once and then returning to instructional practices in place was a pattern this teacher demonstrated throughout the study.

Summary writing goes beyond recording and illustrating important technical terms and their definitions. When students learn summarizing strategies, they learn to organize relational information into compact, meaningful sentences; irrelevant information is sifted out (Alvermann & Boothby, 1983). The end result of effective summarization is a core of coherent sentences that consist of the "gist" of the key concepts. Filtering out irrelevant material through summarization results in improved comprehension and memory of the information read (Rinehart, Stahl, & Erickson, 1986; Taylor & Beach, 1984). Pressley and Wharton-McDonald (1997) support this notion; they theorize children's understanding and memory of text would be improved if they were taught to generate summaries in an ongoing format. Mastropieri, Scruggs and Graetz's (2003) review of reading comprehension instruction research found studies that incorporated self-questioning strategies, such as summarizing, yielded the highest effect sizes (1.33). Summarization is an essential skill for high level recall and comprehension.

Summary. The science expert and the science coordinator were veteran teachers and had a repertoire of instructional practices in place with which they had experienced student success. Their beliefs in the success of their current practices, their perceptions of student reading capabilities and their individual goals for learning outcomes impeded their acceptance of the new strategies.

The expert science teacher did not believe her fourth graders were capable of reading the science textbook. This belief was the impetus for her delivering science content through direct instruction, personal narratives and hands-on activities and left little room for instructional practices that facilitated textbook reading. She a possessed a high degree science domain knowledge and understood the nature of science learning which influenced her content delivery. Students learned science content in her class primarily through experimentation and observation. She used text-book generated summative assessments to evaluate her students' science learning. During the study, she did not comment on her students' achievement on these tests. Instead, she evaluated success through student observation during class discussions and small group work.

Unlike the science expert, the science fair coordinator believed her students were capable of comprehending the science text. However, her focus was not on developing strategic science textbook readers but facilitating her students to achieve on assessments. Therefore, she encouraged her students to learn science subject matter by memorizing facts, terms and their definitions. She assessed student learning with written tests that provided the students with the opportunity to give answers they had memorized; the tests were mainly multiple choice, fill-in-the-blank and matching questions. She had found success with "teaching-to-the-test" as measured by student success on the tests. Therefore, the students paid attention to the facts being presented because they were going to be one the test. Shell, et al., (2010, p. 180) state, "The drawback to this is in terms of focusing on performance (test scores matter) rather than learning." The teacher's perception of student success reached by memorizing answers in order to do well on tests prompted her to develop strong attitudes and beliefs toward her instructional practices in place and, thus obstructing her ability to implement newly-introduced reading instructional strategies more than once and narrowing the curriculum for the students.

The novice teacher. The novice teacher demonstrated the greatest degree of change in the quality and quantity of new strategy implementation. She implemented all the instructional strategies presented in the workshops in the observed lessons throughout the duration of the study. At the beginning, she could be characterized by point two on Duffy's (1993) scale, "teacher controls the strategy." She incorporated the workshop strategies into her practice, but she did not communicate to her students why she was teaching the strategies or how they could apply the strategies when she was not available. The instruction was teacher directed. However, as the study continued, she demonstrated progressive change in her instructional practices when adding each new strategy suggested in the workshops. Her strategy implementation evolved into a package of instructional strategies or strategic processes for each science lesson, teaching her students to coordinate a repertoire of strategic processes, instruction characterized as transactional strategies instruction (Pressley, et al., 1992). As her students experienced success in the implementation of more than one reading strategy, she continued to add strategies to the "package." She stated that multiple strategy implementations required teacher guidance and scaffolding with the teacher gradually giving control of strategy selection and implementation to the students. Her goal is supported by Pearson and Gallagher's (1983) model of gradually releasing control of strategy selection and use to the students. This teacher's developing practice in implementing a package of strategies is supported by Mastropieri, Scruggs and Graetz's (2003) review of reading comprehension instruction research studies, where they found packages of strategies yielded the highest effect sizes (1.33) and included text structure-based strategies, finding the main idea and summarizing.

By the end of the study, the novice teacher's instructional practices can be characterized by point four on Duffy's continuum, "modeling process into content." Point four is characterized by the teacher connecting reading strategy instruction to the text and modeling by “thinking aloud” as the strategy is taught, illustrating the cognitive process of strategy selection and application. Even though she implemented all the strategies presented in the workshop, she did not show ownership or take control of strategy planning until midway through the study. She demonstrated a major breakthrough in ownership of strategy planning during the winter holiday break. She took advantage of the extra time to plan the strategies that she would implement in subsequent lessons throughout the remainder of the school year. Instead of inserting the new strategies into each lesson, her planning indicated she was looking at each lesson and incorporating strategies she knew would facilitate her students’ comprehension.

Rhetorical structure and non-technical terms. As this teacher implemented the new strategies, she developed positive beliefs and attitudes towards them. She connected the strategy implementation with student success (Guskey, 1986). Early in the study, she commented that teaching rhetorical structure was facilitating her students’ comprehension of the science text, and they were becoming more independent in recognizing the rhetorical structure(s) in each science lesson. Her belief statements were substantiated by her practices; identification of the rhetorical structure of each textbook lesson became a key component of the lesson. She also believed in the success of teaching non-technical terms which was supported by her students transferring this learning to other settings such as guided reading groups.

Technical vocabulary. She recognized the new technical vocabulary strategies encouraged her students to broaden their depth of vocabulary knowledge and provided them with the opportunity to use them in other contexts. Readence, Bean, and Baldwin (2000), and Stahl (1986) found learning vocabulary requires multiple exposures over an extended period of time as opposed to rote learning, and that most vocabulary words are learned through contextual encounters. This teacher connected vocabulary learning to results on formal assessments when remarking that she felt her students were doing better on the vocabulary portion on the end-of-chapter science tests. Her belief statements suggest she perceived her students were showing success in learning the technical and non-technical vocabulary terms which reinforced her belief in the success of the vocabulary instructional strategies -- a notion supported by Guskey's theory (1986). Consequently, bolstered by her perceptions of the students' successes, she continued to implement the strategies across science lessons.

Graphic organizers. As the novice teacher progressively implemented the workshop instructional strategies, she developed two important understandings about graphic organizers: (a) multiple rhetorical structures within a given lesson require multiple graphic organizers, one for each structure, and (b) thoughtful selection of organizers that align with the rhetorical structure(s) of each science lesson was essential. Her beliefs developed over time throughout the study as she created and used organizers for each science lesson and believed them to be a successful reading strategy. She explained, "Alignment is the key. They should match what's in the text, and I think that's the key to having students make those critical connections – the text is set up the same way that they're going to use to sift through that same text." She stated that at first, she was hesitant to use multiple graphic organizers that it would be too confusing for the students but she also felt it was unfair and even more confusing for her students if she provided just one organizer and tried to make the text “fit”. She recognized her students will continue to encounter science texts with multiple rhetorical structures within in one lesson and she hoped this exposure to multiple structures had developed a foundation of learning that will lead to independent readers. This teacher’s statements suggest she believes aligning graphic organizers with the text structure facilitates student independence in organizer completion and supports her students’ science textbook comprehension success. Her belief was demonstrated by her utilization of carefully selected graphic organizers in each observed science lesson in the study and the subsequent success of her student utilizing the organizers to summarize the science lesson (Guskey, 1986).

The novice teacher believed that her students had learned to utilize multiple organizers to write a one paragraph summary of the lesson from practice in prior lessons that had more than one rhetorical structure. (Utilizing graphic organizers to summarize a science lesson was the last instructional strategy taught to the teachers.) Her belief in the success of using graphic organizers to summarize a lesson and aid student recall of key concepts is supported in previous studies. DiCecco and Gleason (2002) found that summary writing is scaffolded when students utilize graphic organizers recalling relational knowledge as opposed to recall of isolated facts. Additionally, R. Hall, M. Hall, and Saling (1999) found that students utilizing graphic organizers for summary writing had greater recall of relational knowledge than the students in the control groups. The results of these studies align with Pressley and Wharton-McDonald’s (1997) beliefs that children's understanding and memory of text would be improved if they summarized what they had read. During the final interview, the novice teacher said, "I would say comprehension of the text is definitely enhanced by use of summary writing. Students are forced to restate the big idea of the lesson (topic sentence) as well as the content in their own words. It's a wonderful authentic assessment. I'm really proud of what students have been able to do with guidance but especially on their own. It's taken extra time to provide the scaffolding necessary, but it's a nice investment when you see students able to do it eventually."

Summary writing. The novice teacher so strongly believed summary writing facilitated her students' recall of the text that she considered it a valid informal assessment of comprehension. The strength in her instruction was not simply the summary writing but the application of multiple strategies: vocabulary processing, rhetorical structure and non-technical term identification, reading the text, and organizing key concepts into graphic organizers. The students' application of multiple strategies led to successful summaries of the key concepts, a notion supported by Mastropieri, Scruggs and Graetz (2003) whose review of research indicates strategy packages yield high effect sizes when measuring comprehension.

Summary. The novice teacher with the fewest number years of teaching experience delivered science content primarily by having the textbook read aloud by her students. She had few science textbook reading practices in place. She adopted the science reading instructional strategies presented in the workshop to the greatest degree of the three teachers. Her practices indicated she understood the purpose for the progression of strategies and the importance of multiple strategy implementations. She believed the package of strategies aided in her students' comprehension and recall of the science text which encouraged her to continue teaching the instructional strategies. She scaffolded her instruction, gradually releasing the control of strategy implementation and textbook reading to her students (Pearson &Gallagher, 1983). Her changing instructional methods were facilitating her third graders to be independent strategic informational text readers.

Change in Student assessment. The methods of student assessment were related to content delivery configurations. The teachers established goals or specific learning outcomes and assessed their students to measure those outcomes. For example, the science fair coordinator expected her students to memorize specific science facts and her assessment of their learning provided the students with the opportunity to show they had indeed learned the facts. The expert science teacher and the science fair coordinator changed their instructional practices to only a small degree. Consequently, their mode of assessment aligned with their methods of content delivery and instructional practices they had in place and did not change throughout the study. The novice teacher was the only teacher who changed her formal assessment methods. At the beginning of the study, she used textbook-generated vocabulary worksheets, and formative and summative tests for student assessment. As the study progressed, she created and utilized rubrics to evaluate her students' lesson summaries. Her belief that the summaries were authentic assessments suggests she perceived student reading comprehension success within the framework of summary writing. This perception, supported her positive beliefs and attitudes towards this particular instructional strategy, a notion supported by Guskey's (1986) theory. Summary writing became an embedded instructional practice for her.

The results of both the formal and informal assessment impacted all three teachers' beliefs about strategy implementation. Beliefs in instructional practices are developed when teachers observe their students succeeding as a result of the practices (Guskey, 1986). The expert science teacher and the science fair coordinator continued implementing the strategies they had in place, because they had perceived their students were successful according to the results of the formative and summative assessments they administered. They did not measure success in terms of textbook comprehension like the novice teacher nor did they have multiple assessment results to give them a more complete picture of their students' achievement. There was little evidence the results of the assessments informed their instructional choices. For example, when the science coordinator's students, collectively had not done well on an end-of-lesson assessment, instead of reflecting on her instruction, she attributed the low scores to students not studying the vocabulary terms and their definitions.

On the other hand, the novice teacher changed the science instructional strategies that she had in place because she perceived student reading comprehension success as a result of implementing new strategies. Towards the end of the study she was assessing her students' graphic organizers, vocabulary cards and lesson summaries, and continued to administer the end-of-chapter test to her students. By triangulating the results of the assessments, she had a clear picture of her students' learning which, in turn informed her instructional choices. (See Table 5.1 for a summary of the workshop strategies all three teachers implemented.)

Table 5.1 *Summary of Workshop Instructional Strategies Implemented*

	Melanie	Becky	Jody
Taught a rhetorical structure mini-lesson	3	0	0
Taught the non-technical terms that signal the rhetorical structure.	3	0	1
Connected the rhetorical structure and terms to the science textbook lesson	3	0	1
Graphically displayed the lesson's key concepts, technical and non-technical terms in a graphic organizer	3	2	2
Completed the graphic organizer after the science textbook lesson has been read	3	1	2
Implemented vocabulary strategies that facilitate deep-processing	3	0	1
Utilized multiple graphic organizers if a lesson has multiple rhetorical structures	3	0	1
Utilized the graphic organizer(s) to summarize a science textbook lesson	3	0	0

Note: The degree of observed strategy implementation is rated on a scale of 0 to 3. A rating of 0 indicates the teacher did not implement the strategy, 1 indicates the teacher implemented the strategy once, 2 indicates the teacher implemented the strategy more than once and 3 indicates the teacher implemented the strategy during all observed lessons.

Change in configurations for textbook reading. Throughout the study, the science textbook was consistently read aloud in the expert teacher's and the science fair coordinator's classes. Both reasoned that they could explain a complicated concept to students immediately after they had read it so they would not learn it incorrectly. Their practice aligns with the results of research studies. Wade and Moje, (2000) found students do little content area reading in the classroom or at home as homework. Armbruster et al., (1991), found that teachers often read aloud to students rather than show students how to read textbook material themselves.

In contrast to the science expert, the science fair coordinator believed from the onset of the study her fifth graders were capable of reading the science textbook. Her practice of reading the text aloud changed at the beginning of the second semester of the school year. She directed her students to read the first part of the science lesson with a partner and to read the last part silently. She stated that asking her students to read independently was a usual practice for second semester. She was encouraging them to be more independent readers. Unlike the novice teacher, who had prepared her students for independent reading by teaching specific informational text reading strategies and scaffolding instruction as the students practiced them over time, she made the “leap” to independent reading simply because it was the beginning of second semester.

The novice teacher did not directly state a belief in reading the science text aloud, but her teaching practice supports this belief. Throughout the study, she either read the text aloud to her students or called on better readers to read the text aloud, a common practice found among teachers (Armbruster, et al. 1991). However, this practice began to change. During the last lesson I observed, she had released the responsibility of textbook reading to her students. She divided the students into small groups; each group could decide how they read the text (e.g. round robin, in unison); she instructed the students to discuss each page after they read it. One group, who needed differentiated instruction met with her at the reading table and as they took turns reading the text aloud, she provided clarification and direct instruction for this group. The change in the configuration for reading in the novice teacher’s room suggests she began to feel more comfortable in releasing the responsibility of science textbook reading to her students. She knew her students were capable of implementing the reading strategies she had been teaching and they had been practicing throughout the semester, so she released the responsibility of reading the text to them. Her practice aligns with Pearson and Gallagher's (1983) model of gradually releasing the control of strategy selection to the students. The only exception to her evolving change in instructional decisions was with the special-needs students who continued to receive her scaffolded instruction.

Why volunteer for the study? Since both the expert science teacher and the science fair coordinator had strong beliefs in their instructional practices, why would they volunteer to participate in this study? The principal strongly believed in providing her teachers instruction in new reading strategies during professional development workshops. Consequently, the teachers at Riverton Elementary school had been engaged in a series of workshops that focused on reading strategies for narrative text; the workshops were school-wide and all elementary teachers were required to participate. Instructional strategies to read and comprehend informational text had not been addressed in the previous workshops, and the principal was enthusiastic about the workshops presented in conjunction with this study. She even used school funds to hire substitute teachers so the workshops could be held during regular school hours. I had specifically requested to work with the third, fourth and fifth grade teachers and it is a reasonable assumption that they felt obligated to attend the research workshops due to the principal's strong beliefs combined with her willingness to provide the participating teachers with release time.

Informational Text Pedagogical Knowledge Assessment

The results of the informational text pedagogical knowledge assessment indicate the three teachers gained overall pedagogical knowledge about informational text with the novice teacher showing the greatest gain and science expert the least. The novice teacher's percent of correct answers on the pre-test was greatest which suggests she began the study with a broader base of informational text pedagogical knowledge than the other two teachers. She was a recent graduate of the state university, and it is likely she was exposed to current research and theories for reading informational text. She also had less teaching experience to firmly entrench perceptions.

Even though the expert science teacher and the science fair coordinator showed growth in knowledge about teaching informational text, they did not always apply this knowledge in the classroom, implementing few of the instructional strategies introduced in the workshop. This suggests that knowledge of strategies alone does not always lead to implementation. The expert science teacher believed her students' were unable to read the science textbook, and her actions throughout the study indicated she did not value teaching reading strategies would enable them to read and comprehend the text. The science fair coordinator's task-oriented method of instruction emphasized memorizing facts that she had sifted out from the text. She did not explicitly encourage students to learn and practice reading strategies so they could eventually determine the relevant information to be learned independently. Her second semester practices showed that she assumed they would do so automatically (See Table 5.2 for a summary of the results of the informational text pedagogical knowledge assessment.)

Table 5.2 *Summary of Growth in Informational Text Pedagogical Knowledge.*

	Melanie	Becky	Jody
What is the purpose of informational text?	✓	✓	✓
How is information in informational text organized?		✓	✓
Name and describe the different ways informational text can be organized.	✓	✓	✓
What is the function of non-technical vocabulary in informational text?	✓	✓	✓
Give examples of non-technical vocabulary.	✓	✓	✓
What are graphic organizers?			✓
How do graphic organizers facilitate students' comprehension of informational text?	✓	✓	✓
How can graphic organizers facilitate students' summarization of informational text?	✓	✓	✓
Describe instructional strategies that facilitate students' comprehension of vocabulary terms found in their science textbook.	✓		✓

Note: The ✓ in the box next to each question indicates growth in knowledge. The post-test score was higher than the pre-test score for this particular question.

Summary. The results of the analysis suggest that teachers need to have the opportunity to apply newly learned strategies through rehearsal in a risk-free environment during the professional development workshops. This change would also give the teachers the opportunity to pre-plan classroom strategy implementation with the workshop facilitator. The content load was heavy in each of the three workshops. If the content were divided over a series of shorter workshops that met more frequently, such as once a month, the number of strategies per workshop could be reduced, alleviating the cognitive load for the teachers. If the teachers learned only one or two strategies per workshop session, they might be more likely to implement them. In this study, little time was allowed for the teachers to plan strategy implementation in their lessons.

There was some planning time allotted at the end of the workshop sessions but the teachers chose to leave instead of work on lesson plans. The workshops would have been better designed if they incorporated a specific time for the teachers to design a lesson and teach it to their peers. Just as young students need repeated practice to learn a strategy, (Hilden & Pressley, 2007) adults need to practice strategy instruction before they achieve a level of teaching competency (Alexander & Fives, 2000). The practice sessions would give the teachers the opportunity to apply the strategies they had learned in the workshop and would have provided me with the opportunity to clarify any misconceptions and reteach the new strategies as needed. This notion is supported by Birman, Desimone, Porter and Garet (2000) who found workshops that had more time for active learning resulted in an increase in the participants' knowledge and skills and change in classroom practice. Both the science expert and the science fair coordinator indicated they did not fully understand rhetorical structure and had difficulty recognizing it in their science textbooks. This discovery was not made until the end of the study. Both teachers were able to identify rhetorical structure during workshop exercises but apparently did not understand it well enough to apply to their classroom settings. Their confusion offered one explanation to why they did not teach rhetorical structure and combined with their beliefs about science textbook reading, they did not implement the strategy. If I had discovered their lack of understanding earlier, I could have revised the workshop format so that strategies could have been taught and practiced again. Rehearsal creates permanent long-term memories and retrieval is more accurately recalled and usable (Shell, et al., 2010). I believe more strategy implementation would have resulted if I held the teachers directly accountable for teaching at least one lesson with the new strategies by providing time them to write out one lesson plan under my supervision. Further, accountability would result by asking the teachers to share the results and student work products of their early implementation attempts.

Guskey (1986) states teacher-change can be a long and sometimes difficult journey. Teachers value the practices they have in place because they have observed success in terms of student achievement over a period of time. The two veteran teachers in this study did not change their instructional practices even though they agreed to participate. They were complying with the request made by their principal. The results of the study may have differed if the teachers participated because they were seeking new instructional strategies to teach science textbook reading. Instead, previous reading workshops conducted by the principal, set precedence for participation.

Student assessment is central to Guskey's model. He believes teachers change instructional practices when they observe success in terms of student achievement. Student assessment in this study was not consistent across the three teachers. The science textbook was new the year this study took place. The teachers were not familiar with the textbook assessments that were part of the textbook adoption. Therefore, the teachers experimented with the textbook assessments at the beginning of the school year. Consequently, each teacher took a different assessment path during the study making it difficult to discuss student success in terms of the same type of measurement, e.g. the end-of-chapter test. Even though methods of assessment differed among the teachers, consistently throughout the study, they were asked to state their perceptions of student achievement as a result of new strategy implementation. Perceptions of student achievement align with Guskey's model. Teachers' beliefs in the success of strategy implementation result when they perceive success in student achievement. The flexible modes of assessment did provide the teachers with opportunities to change the ways they measured student achievement to align with the implementation of new strategies.

Summary

This study established a relationship between professional development workshops and change in three teachers' science textbook reading instructional strategies. The degree of change appears to be related to several inner-related factors: (a) teaching experience, (b) teachers perceptions of self, (c) mode of content delivery, and (d) teacher beliefs. A result of the data analysis is my model (See Figure 5.1) showing the influences on teachers' instructional practices and how they affect teacher change. Two teachers with the greatest longevity of teaching experience had established instructional strategies and modes of content delivery which in both cases did not emphasize student textbook reading skills. Their modes of content delivery were related to their self- perceptions as "science teachers" who provided learning experiences for their students outside of reading the science textbook. Their beliefs about student learning are related to their classroom teaching experiences and curriculum design. One teacher believed her students were not capable of reading the text, and the other teacher believed in the drill-practice-test type of instruction to prepare her students for the state standards assessments. The teacher with the least amount of experience demonstrated the most change in science textbook reading strategy implementation. The main mode of content delivery was her students' reading and comprehending the text. Her progression of strategy implementation aligns with Guskey's (1986) model of teacher change: (a) she implemented the strategies, (b) she believed her students were successful in reading and understanding the science textbook as a result of strategy implementation, and (c) she believed in and continued to implement the new strategies.

This case study provided me with multiple avenues to examine the relationships between professional development and the implementation of specific instructional strategies. This multi-faceted examination facilitated my insights into developing effective professional development for teachers with varying domain and pedagogical knowledge and teaching experience. Multiple classroom observations provided me with rich detail of each teacher's instructional practices whether they were repeated or changed over time. The observations provided me with the opportunity to see the teachers during instruction. The results of the lesson reflections provided insights into the teachers' perceptions of how they taught during each science lesson, while the interviews provided the teachers with the opportunity to express why they taught their lessons with specific strategies. Thus the data was triangulated with rich detail: (a) what the teachers did, (b) what the teachers thought they did, and (c) and why. Detail to this degree might not be revealed in an experimental study where cause and effects are the primary focus.

Limitations

There are several factors to consider with the findings of this study. This study was bounded by demographics – the location of school and size of school. This was a case study of teacher change that was informed by three teachers' interaction with professional development. Although I have provided a rich, thick description of the teachers' instructional practices and three professional development workshops, the teachers and their interactions with the workshop instruction cannot be duplicated. The research design greatly limits the likelihood of generalization of results to other persons.

I was the principal researcher and conducted the three major interviews and the lesson reflection interviews and the classroom observations. It is possible the teachers may not have been as candid with their responses as they might have been if an outside party interviewed or observed them.

The study focused on instructional strategies for science textbook reading. Science is a subject that is conducive to hands-on learning and multiple modes of content delivery, perhaps diminishing the importance of textbook reading and comprehension in the view of elementary grade teachers. This limitation might not have occurred if the strategies were implemented in other content area reading classes such as social studies where textbooks and primary documents constitute major sources of information.

Each teacher in this study assessed her students' science learning differently. The third and fourth grade teachers did not directly discuss test scores with me after strategy implementation, therefore limiting connections between student achievement indicated by the test results and their beliefs in new strategy implementation. A primary precept in Guskey's (1986) theory of teacher change is that teachers will value instructional practices because they observe student achievement after the practices have been implemented. Close examination of formative and summative student assessment in connection to strategy implementation would have provided the fourth and fifth grade teachers with tangible evidence of student achievement.

The design of this study was limited due to the school's configurations for teaching science. Since one third, fourth, and fifth grade teacher taught science to both same-grade classes, control groups could not be established to analyze student achievement between control and experimental groups. Experimental and quasi-experimental studies that measure student achievement as the result of teachers implementing new strategies learned in professional development workshops are needed to further validate the relationship between student achievement and teacher change.

Significance of the Study

Few studies have specifically examined the implementation of instructional strategies that facilitate students' science textbook reading (Wigfield et al., 2008). In addition, numerous studies have examined student-change as the result of implementation of informational text reading strategies (e.g. Alvermann, 1981; Alvermann & Boothby, 1983; R. Hall, M. Hall, & Saling, 1999) but few, if any, have examined teacher change based on a focused professional development.

There are strengths to this study. This study utilized of a combination of several strategic instructional practices that facilitates student science textbook reading comprehension. Studies that implement a model which incorporates a combination of the strategies, particularly studies that combine graphic organizer instruction with other comprehension strategies are lacking in the research literature (Ae-Hwa, Vaughn, Wanzek, & Wei, 2004).

Suggestions for Future Studies

Multiple models for professional development can be found in the research literature built from similar theoretical foundations. However, there are few studies that explore relationships between active teacher-change and professional development workshops. To guide future professional development workshops, future studies examining this relationship are needed.

Conclusions

To prepare students for a future inundated with constantly-changing information and to become strategic, independent readers of informational text, we need to continue to examine instructional strategies that facilitate content area reading specifically by providing teachers of all grade levels with training in research-based informational text reading strategies. Professional development workshops to promote teacher-change needs to consider the teachers' current mode of content delivery and experience background in its design. A workshop design that meets the needs of all teachers along the continuum of development can be accomplished by providing time within the workshop setting and under the supervision of the facilitator for the teachers to plan lessons during which the new strategies are implemented. Time for strategy practice, strategy refinement and clarification of misconceptions is needed before the teachers are held accountable to implement the strategies in their classrooms.

Resources

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Appendix A

Pre and Post-Assessment

Date____________Name____

1. What is the purpose of reading informational text?

2. How is information in expository (informational text) organized?

3. Name and describe the different ways informational text can be organized.

4. What is the function of non-technical vocabulary in informational text?

    b. Give examples of non-technical vocabulary.

5. What are graphic organizers?

   c. Explain how graphic organizers facilitate students' comprehension of informational text.

   d. Explain how graphic organizers can facilitate students' summarization of informational text.

6. Describe instructional strategies that facilitate students' comprehension of vocabulary terms found in their science textbook.

Appendix B

Rubric for Pedagogical Knowledge Assessment

1. What is the purpose informational text?

Score	Answers
1	The purpose of informational text is to convey information and facts about a specific topic.
0	Answer does not include terms related to “information” and “facts.”

2. How is information in expository (informational text) organized?

Score	
5	Informational text is organized to relate concepts and ideas across sentences and paragraphs to convey a set of related facts and information in order to provide the reader with a conceptual understanding a specific topic. Information is related in sentences within a paragraph; ideas within paragraphs are related to one another.
3	Information text is organized to relate concepts and ideas to explain a specific topic.
1	No or little information provided in answer to explain the organization of informational text.

2. Name and describe the different ways informational text can be organized.

Score	
5	Identification and description of the following: main idea/detail; compare/contrast; cause/effect; problem/solution; cycles; time order
4	Four of the above
3	Three of the above
2	Two of the above
1	One of the above

4. What is the function of non-technical vocabulary in informational text?

Score	
2	Non-technical vocabulary terms are words whose purpose is to signal connections between thoughts and ideas.
1	Incorrect response

4a. Give examples of non-technical vocabulary

Score	
4	Terms such as “same as”; “different from”; “compared to.” At least 3 examples
3	Two examples
2	One example
0	No examples

5. What are graphic organizers?

Score	
5	Graphic organizers are visual and spatial displays designed to facilitate the teaching and learning through the use of lines, arrows, and spatial arrangement that provide visual depictions of key terms and concepts and the relationships among them. Graphic organizers can be teacher generated or student generated. Graphic organizers can be created before, during or after reading information text in order to facilitate comprehension of the reading. Graphic organizers aide students in connecting what they already know to what they learn in the text.
3	Graphic organizers are blanks on a sheet of paper that students fill in by finding the answers in the text.
1	No answer or incorrect response.

5a. Explain how graphic organizers facilitate students' comprehension of informational text.

Score	
5	Graphic organizers visually organize key concepts in information text. They emphasize the concepts that are important. They show the relationship between and among concepts presented in the text. They engage students in the reading of the text. They clarify "inconsiderate" text; text that is poorly organized to convey information. They facilitate the recall of the information just read.
3	Any three of the above answers
1	One of the above answers.
0	None of the above answers.

5b. Explain how graphic organizers can facilitate students' summarization of informational text.

Score	
5	Graphic organizers provide students with the essential information needed to summarize text. They help the students sift through the information in order to identify information that is essential to the comprehension of the text and to eliminate the non-essential information. They provide the students with an organization to summarize the essential information. They provide the students with definitions of key concepts that are defined within the context of the text.
3	Any three of the above answers.
1	One of the above answers
0	None of the above answers

6. Describe instructional strategies that facilitate students' comprehension of vocabulary terms found in their science textbook.

Score	
5	Strategies that involve deep processing and multiple exposure to terms. Strategies include pre-reading, during-reading, and after reading activities. Should include examination of terms within context of science text.
3	Description of deep processing and multiple exposure strategies that are limited to one or two of pre-reading, during-reading, and after reading activities
1	Strategy that is limited to looking the word up in a dictionary and writing the definition with a possible re-visitation during reading.
0	No strategy named.

Appendix C

Sample Lesson Plan
Grade Four Chapter 8; Lesson 1

Day 1

- Pages 358-359
- Explore 1-5 – all class demonstration
- 6-7 responses in journals or as a group (pod) activity where students as a group record responses on chart paper and share with class

Introduce Chap. 8

- Read titles of 4 lessons
- Make predictions what the chapter is about
- Ask students to predict what "solar system" means
  - Write predictions on white erase board
- Introduce terms on p. 357; draw from students' prior knowledge to elaborate on terms

Days 2-3 Process of Reading pgs 360-361

- Vocabulary building exercise: rotation, axis, revolution, orbit or any other terms that you feel impact comprehension such as "apparent"
- Text structure instruction: For your very first text structure lesson you might want to say something like this: "What is the purpose of reading a science book? Why was your science book written? What can you find out by reading your science book? How is your science book different from a book that tells a story? Your science book is written in specific ways to provide you with information."

  For this particular lesson say: "Today we are going to read part of lesson one which tells us about two ways the Earth moves: rotation and revolution. I want you to read carefully to find out what rotation and revolution cause. Who knows what "cause or causes" mean? Listen to the word 'causes' as I use it in this sentence. 'The rain causes the ground to be wet.' What does the word 'causes' mean in that sentence? What causes the ground to be wet? We say the rain is the cause and the wet ground is the effect or consequence. Listen to this sentence: 'Running laps causes me to get thirsty. What causes me to get thirsty? What is the consequence of my running laps? The following sentence is a little bit different. Instead of using the word 'cause' I am going to use the word 'because.' Mom drove me to school because it is snowing. What caused Mom to drive me to school? What is the consequence of the snowy weather? At this point, judge whether you need to provide more examples of cause and effect. Perhaps solicit student examples of cause and effect.

  Say, "As you read today, find out the answers to these two questions: What is a consequence of Earth's rotation? What is a consequence of Earth's revolution?" (Perhaps these two questions can be written on the white-erase board.)

- Read paragraphs 1 & 2
  - Ask students to reread the sentence "Rotation is the act of spinning." Ask students to define and/or demonstrate 'spinning'
- Read 3rd paragraph
  - Ask students to reread "An axis is a real or imaginary line that an object spins around." Ask students to define and/or demonstrate "axis"
- Read the first paragraph under the heading *Apparent Motion* on p. 361. Ask the students to answer the first question: What is a consequence of Earth's rotation? What does Earth's rotation cause? Read the next two paragraphs. As the questions again. Ask: "What does the word *cause* mean in the first sentence of the third paragraph? What does the Earth's rotation cause?"
- Read the paragraphs under the heading *Shadows* on pg. 361. Ask a new question: When outdoors, why is your morning shadow different in the morning from your afternoon shadow? What causes this difference?
- Complete matrix for this part of lesson one
- Summary – Wrap-up: Draw students' attention to the *Quick Check* on pg 361 and terms "cause and effect." Once again, ask them what it means? Ask them to answer the question. They can use the matrix to help them.
- Critical thinking!
- Fact!

Appendix D

Description of Instructional Strategies

Teachers:

Please continue to teach rhetorical structure as needed. Continue to examine the textbook for each science lesson and determine the rhetorical structure. Incorporate the rhetorical structure in your lesson. For example: "Today we are going to compare and contrast viruses with plant and animal cells."

Continue to probe students to find non-technical vocabulary that signal the relationship in the rhetorical structure. For example, "Look in the heading. What words tell us we are going to be comparing and contrasting? What do they mean?"

Continue to utilize graphic organizers that align with the science text's rhetorical structure. For example, for compare and contrast use a Venn diagram or a matrix.

Continue to teach technical vocabulary providing your students with multiple exposures to the terms---activities that go beyond looking the words up in the glossary and writing their definitions.

Lastly---this is new. Teach your students to use the graphic organizer to summarize the passage. Please keep these summarizations for me to analyze. The students might use these summaries to study for their quizzes, tests.

Appendix E

Teacher Observation Form

	Teacher/Lesson	Section	Date/Time
Rating	Rhetorical Structure Lesson	Notes Below	
	1. Teacher establishes a purpose for reading science textbook		
0	Teacher does not establish a purpose for reading the science textbook.		
1	Teacher makes a statement that aligns with “students read science a textbook to learn new information.”		
1	Teacher makes a statement and also asks a question and elicits one of more student responses to establish purpose of reading the science textbook. (1 probe)		
1	Statement and more than 1 probe		
	Total		
	2. Teacher teaches the concept of rhetorical structure.		
0	Teacher does not introduce rhetorical structure of science textbook.		
1	Teacher offers a definition for rhetorical structure. “Rhetorical structure is the way an author puts words, sentences and paragraphs together to convey a thought or to provide information.”		
1	Teacher probes the students to describe rhetorical structure of narrative text.		
1	Teacher probes the students to compare rhetorical structure of narrative text to rhetorical structure of informational text.		
1	Teacher connects rhetorical structure lesson to science text.		
	Total		
	3. Teacher provides instruction in the meaning of the specific rhetorical structure of the passage the students are about to read.		
0	Teacher does not identify rhetorical structure of passage.		
1	Teacher identifies format with a simple statement. “Today we are going to read about cause and effect.”		
1	Teacher defines the rhetorical structure. “Today we are going to read about cause and effect. Cause and effect means when on event causes another event to happen.”		
1	Teacher provides an example. “Today we are going to read about cause and effect. Cause and effect means when one vent causes another event to happen. For example, ‘It was raining today so Mom drove me to school.’”		
1	Teacher probes students to ID cause/effect in the example given. “What caused Mom to drive me to school today? What was the consequence or the effect of the rain this morning?”		
1	Teacher connects example to the passage about to be read. “Today we are going to read about Earth’s rotation. As you read, find out what Earth’s rotation causes.”		
	Total		

	Teacher/Lesson	Section	Date/Time
Rating	Rhetorical Structure Lesson	Notes Below	
	4. Teacher provides instruction in non-technical terms that signal the rhetorical structure of the passage		
0	Teacher proves no instruction in non-technical terms for the passage		
1	Teacher identifies non-technical terms in passage to be read.		
1	Teacher provides definitions of non-technical terms found in the passage.		
1	Teacher uses the non-technical terms in an example sentences.		
1	Teacher provides other example sentences.		
1	Teacher probes students to identify the relationship the non-technical terms signaled in her additional example sentences.		
	5. Teacher provides instruction in non-technical terms that signal the rhetorical structure of the passage		
0	Teacher proves no instruction in non-technical terms for the passage		
1	Teacher identifies non-technical terms in passage to be read.		
1	Teacher provides definitions of non-technical terms found in the passage.		
1	Teacher uses the non-technical terms in an example sentences.		
1	Teacher provides other example sentences.		
1	Teacher probes students to identify the relationship the non-technical terms signaled in her additional example sentences.		
	Total		
1	Teacher offers a definition for rhetorical structure. “Rhetorical structure is the way an author puts words, sentences and paragraphs together to convey a thought or to provide information.”		
	Total		

	Teacher/Lesson	Section	Date/Time
Rating	Rhetorical Structure Lesson	Notes Below	
	6. Teacher connects lesson in rhetorical structure and non-technical terms to the passage during reading.		
0	The teacher makes no connection to text passage.		
1	Teacher makes simple statement about the relationship between the lesson and the passage during reading. "We have just read an example of cause and effect.		
1	Teacher probes students during reading to elicit responses concerning rhetorical structure of passage(s). "Can you give me an example of cause and effect in the passage we just read?"		
1	Teacher probes students more than once during reading to elicit responses concerning rhetorical structure of passage.		
1	Teacher probes students during reading to elicit responses concerning the technical terms that signal rhetorical structure. Example: "What does the word 'cause' mean in the second paragraph of the passage we just read?"		
1	Teacher directs students to reread passage or parts of passage to clarify and/or emphasize rhetorical structure.		
	Total		
	7. Post-reading instruction and probes that connect rhetorical structure lesson (knowledge) to passage just read.		
0	Teacher doesn't probe students to make connections between rhetorical structure knowledge and passage just read.		
1	Teacher asks students to answer pre-reading probes. What is a consequence of Earth's rotation?"		
1	Teacher asks students to state an example of rhetorical structure they found in the passage they just read.		
1	Teacher probes for more than one example of rhetorical structure.		
1	Teacher asks students to explain relationship of concepts found in the passage examples they provide.		
1	Teacher asks students to identify non-technical terms in the passage they just read.		
1	Teacher asks students to tell how the term(s) signal the relationship between ideas		
1	Teacher directs students to reread passage to look for rhetorical structure (relationship of ideas) and the term s that signal those relationships,		
1	Teacher directs the students to summarize, review and/or wrap-up the lesson.		
	Total		

	Teacher/Lesson	Section	Date/Time
	8. Graphic organizer construction for all lessons	Notes Below	
0	Teacher does not utilize a graphic organizer		
1	Teacher utilizes graphic organizer but it does not depict relationship of ideas as presented in rhetorical structure of passage.		
1	Teacher utilizes a graphic organizer that visually depicts the relationship of ideas presented in the rhetorical structure of passage.		
1	Teacher utilizes non-technical vocabulary found in passage.		
	Total		
	Graphic organizer is: (□)		
	displayed on wall (all class organizer)		
	individual organizers (one for each student)		
	Made (□)		
	before lesson		
	during lesson		
	after lesson		
	Constructed by (□)		
	teacher		
	students and teacher		
	students only		

	Teacher/Lesson	Section	Date/Time
		Notes Below	
	If this is a review lesson:		
0	Teacher does not mention previously taught format		
1	Teacher mentions previously taught format but does not elaborate.		
1	Teacher reviews previously taught format by providing examples.		
1	Teacher reviews previously taught format by asking students to provide examples.		
1	Teacher reviews previously taught format by asking students to provide examples from their science textbook.		
0	Teacher does not mention previously taught non-technical terms.		
1	Teacher mentions previously taught non-technical terms but does not elaborate.		
1	Teacher reviews previously taught non-technical terms by providing examples		
1	Teacher reviews previously taught non-technical terms by asking students to provide examples.		
1	Teacher reviews previously taught non-technical terms by asking students to provide examples from their science textbook.		
	Total		

Appendix F

Lesson Reflection Form

Teacher's name________________________________Date of lesson________________

Science Textbook
Lesson____

1. Describe the rhetorical structure strategy taught.

2. Describe the vocabulary strategy taught. Why did you use this strategy?

3. Describe the graphic organizer taught. Why did you use this

   organizer?

   a. During what part of the lesson was the organizer taught? Why did you teach it at this time?

   b. Who constructed the organizer and why?

4. Did you have the students summarize the passage? How?

5. How did you assess your students' comprehension of the passage? Why did you assess comprehension this way?

6. What were the strengths of your lesson? What went well?

7. What didn't go well in the lesson? What will you do differently next time the students read a passage from their science text?

Appendix G

Questions for Semi-structured Principal Interview

1. Describe the reading instructional strategies that you have introduced to the elementary teachers during the time you have served as principal of this school.
    a. Have any of the instructional strategies you have introduced been specifically for informational textbook reading comprehension? If so, please describe them.
        i. Has rhetorical structure of informational text been the focus of the instructional strategies you have introduced? If so, describe them.
        ii. Has the utilization of graphic organizers been the focus of the instructional strategies you have introduced? If so, describe them.
        iii. Have any of these instructional strategies you have introduced included instruction in technical vocabulary terms found in the students' science textbook? If so, describe them.
        iv. Have any of these instructional strategies you have introduced included instruction in non-technical vocabulary terms found in the students' science textbook? If so, describe them.
2. Describe the effect of your introduction of new instructional reading comprehension strategies on the third, fourth, and fifth grade teachers' instructional practices?
    a. Were they receptive to change in their routines and practices? Explain.
    b. Were these teachers receptive to implanting the new instructional practices repeatedly over time? Explain.
    c. Explain how these teachers measured change in their students' reading comprehension after they implemented the new instructional practices.
3. What is your perception of the third, fourth, and fifth grade students' overall ability to read and comprehend their science textbook?
    a. What do you perceive as their main roadblock to reading and comprehending their science textbook?
    b. What are your goals for third, fourth and fifth grade students' overall reading comprehension achievement of their science textbook?
4. Explain how the third, fourth and fifth grade teachers accommodate students reading below grade level.
5. Are there any students in grades three, four, and five who are acquiring English as a second language? If so, indicate if their English language skills are at a level that would impede their success in reading and comprehending their science textbook.
    a. How do the third, fourth and fifth grade teachers accommodate students who are learning English as a second language?
6. What are your outcome goals of the professional development workshops I am going to conduct as part of this study?

Appendix H

Questions for Semi-structured Teacher Interviews

1. Describe the rhetorical structure instructional strategies you have been implementing during science textbook reading lessons.
    a. Describe the degree of success of you have experienced in implementing these strategies.
    b. How have you measured this success?
        i. What science textbook reading comprehension assessment have you implemented?
        ii. How have you implemented it?
        iii. How have measure the results?
        iv. Please articulate the specific results.
2. Describe the vocabulary instructional strategies you have been implementing during science textbook reading lessons.
    a. Describe the degree of success of you have experienced in implementing these strategies.
    b. How have you measured this success?
        i. Are there any vocabulary items in the reading comprehension assessment? If so, what percent of the questions are vocabulary related?
        ii. What are the results of the vocabulary assessment items?
3. Have you included passage summarization in your science reading lessons? (For the last interview)
    a. If so, how often have you asked your students to summarize a science textbook passage have they have read it?
    b. What instructional strategy did you utilize to facilitate summarization?
        i. Describe how you used this strategy.
4. How do you feel about your implementation of the text structure instructional strategies? Vocabulary strategies?
    a. Why or why not do you feel these strategies have been successful?
    b. Will you use these strategies again? Why or why not?
5. Overall, have the professional development been beneficial? Why or why not? (For the last interview)